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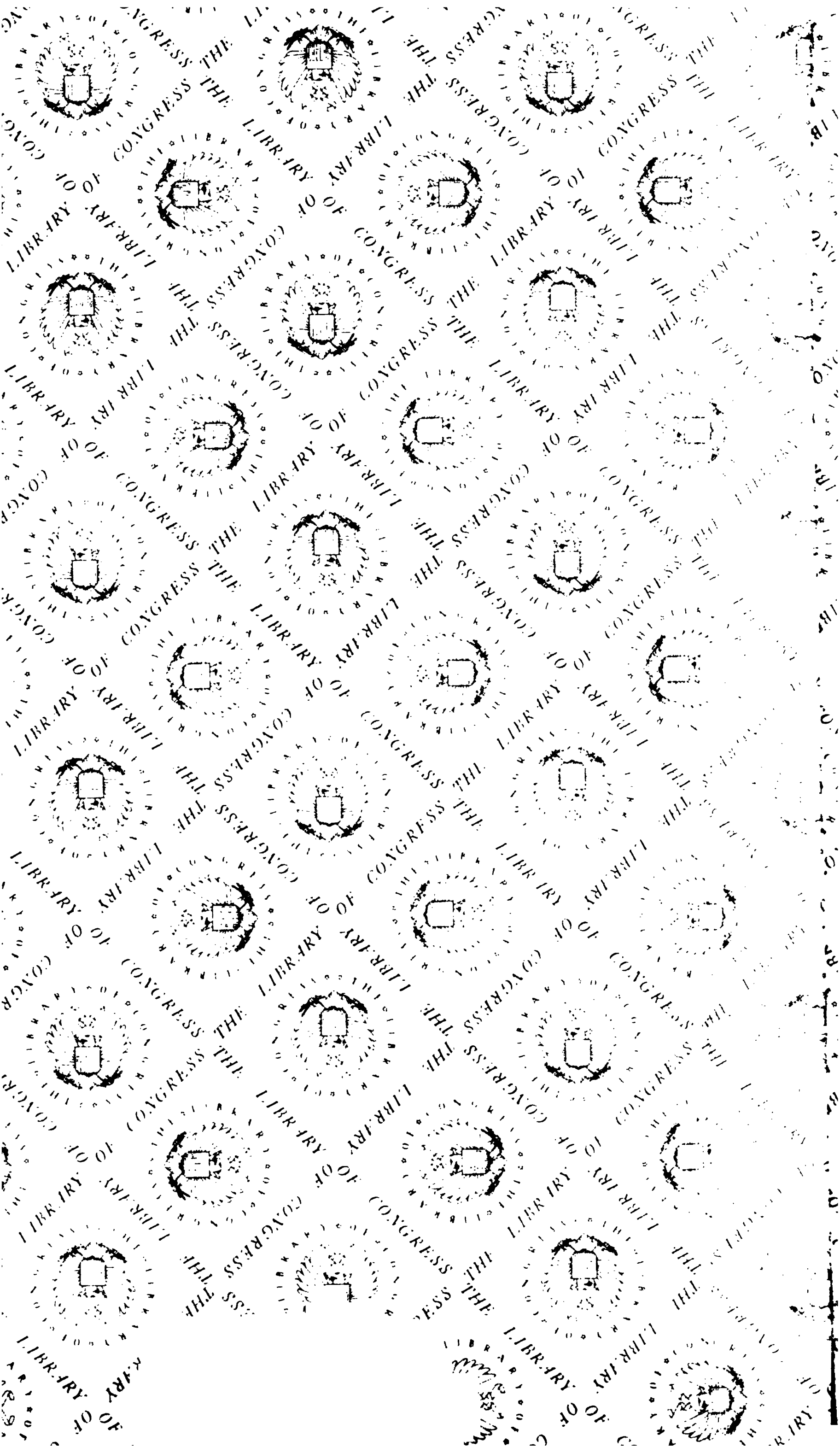
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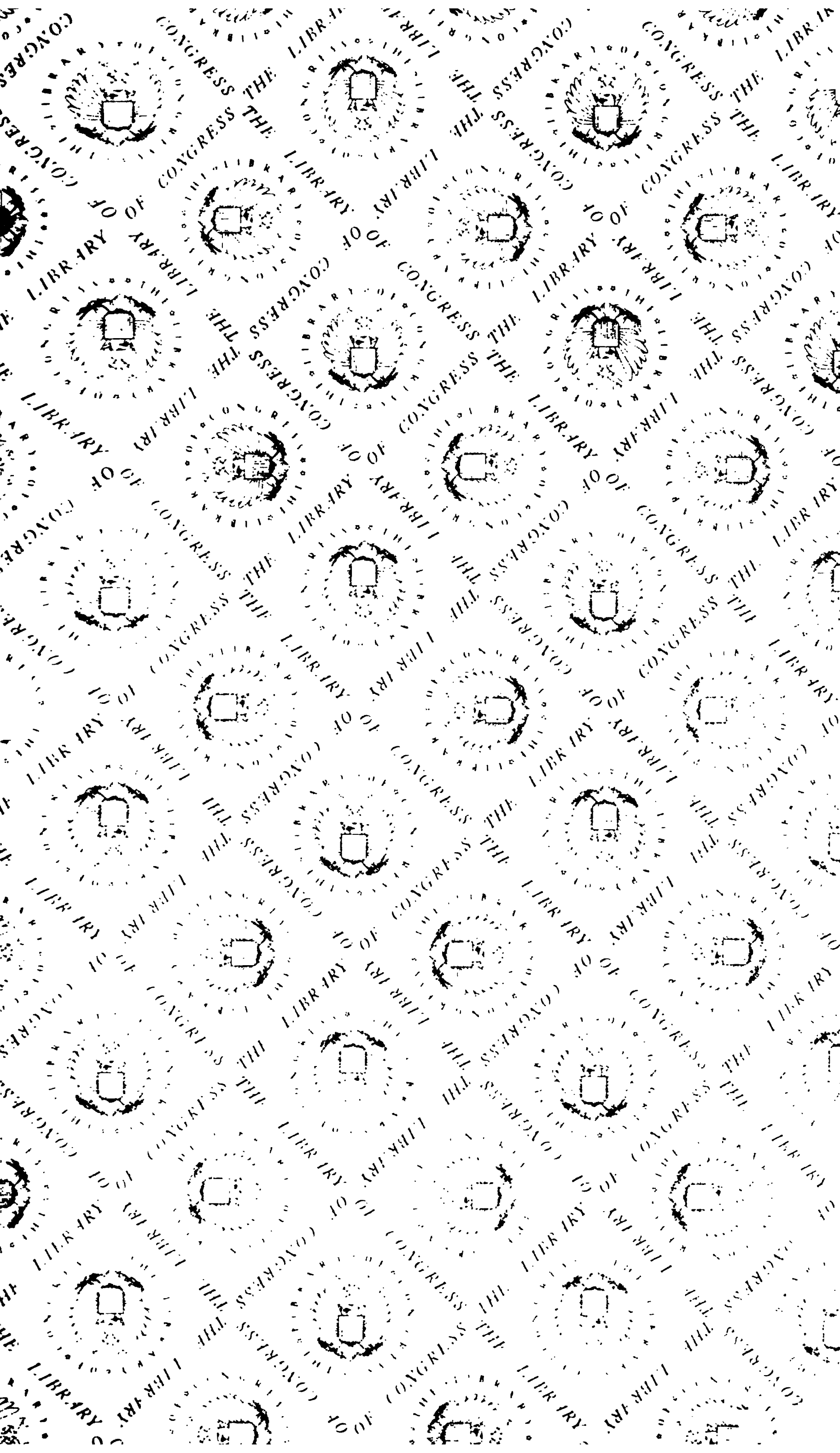
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CONTENTS.

	PAGE.
Acid Phosphate	419
Acts	186
Address by Hon. F. H. Newell.....	26
Agriculture in China and Japan.....	411
Alaska-Yukon-Pacific Exposition, The.....	31
Annual Exhibition of Poultry.....	63
Avocado Pear in California, The.....	259
Banyan and Allied Species, The.....	121
Board of Agriculture and Forestry, Routine Reports..... .....14, 68, 133, 183, 204, 223, 260, 337, 358, 405, 432, 465	465
Brush Fires on Tantalus.....	72
By Authority—Notices, New Laws..... .....56, 72, 144, 186, 214, 246, 393	393
Crystallized Banana	348
College of Hawaii, Its Work and Outlook, The.....	2
Conservation and the Law.....	366
Conservation Hearing	102
Conservation in Hawaii	368
Copra	278
Cotton in Hawaii	210
Cotton Prospects in Hawaii.....	394
Dr. Silvestri's Paper	396
Dry Farming	150
Editorial	1, 257, 279, 382
Enemies of the Hawaiian Forest.....	272
Enormous Sugar Crop.....	276
Executive Order	148
Experiment Station, H. S. P. A.....	364
Farmers' Bulletins	384, 431
Farmers' Institute for Women.....	396
Farmers' Institute Workers	258
Floral Parade, The 1910.....	269
Flowers	277
Forest Area of the South.....	354
Forest Planting in Oahu.....	180
Forest Reserves, Territory of Hawaii.....	2

	PAGE.
Forest Resources of the United States	170
Forest Sermon, A	176
Glossary of Scientific Names of Economic Insects	282
Governor Frear's Message	98
Grapes	277
Guava Jelly	278
Hawaiian Beekeepers' Association Annual Meeting, The	32
Hawaiian Fishes at Seattle	276
Hawaiian Poultry Association	463
Hawaiian Rubber	271
Hawaiian Tobacco Industry, The	76
Index to Volume V	72
Inter-Crops	461
Interesting Publication, An	56
Kauai Onion Crop	243
Kohala Mountain Forest Reserve Hearing	480
Kohala Mountain Forestry Reserve	471
Land Settlement	274
Legislature Acts	144
Lihue-Koloa and the Moloaa Forest Reserves on Kauai, The	236
Local Rubber Outlook	79
Marketing Rubber	455
Mauna Kea Forest Reserve, The	229
Modification of the Makawao Forest Reserve	234
Moloaa Forest Reserve, The	240
Monstera Deliciosa	275
Mosquito Powder	348
Mr. Pinchot's Address at Spokane	377
National Conservation Commission	57
National Irrigation Congress	443
Need of Practical Activity, The	171
New Farmers' Bulletins	132
New Forest Reserves	217
New Hawaiian Shrub, A	503
New Rubber Industry, A	270
New Rubbers, The	504
Oahu Water Resources	130
Observations on Horticulture in Hawaii	448
Our Melon Fly Pest	281
Papaia, The	277

F

	PAGE.		
Fairchild, Senator	113	Forest Enemies	
Farmers' Institute Workers.....	258	Forest Exhibit	
Farming, Dry.....	150	Forest Fires	72, 13
Farming, Truck	144	Forest Planting	
Ficus	121	Forest Reserve, Lihue-Koloa..	
Fig Cultivation	268	Forest Reserve, Makawao.....	
Fig Insect	208, 340	Forest Reserve, Mauna Kea...	
Fig, Smyrna	227, 268	Forest Reserve, Moloaa.....	
Fig Wasp	436	Forest Reserve, Waihou Sprin	
Fig, Wild	268	Forest Reserves	21
Fire, Forest, Wahiawa.....	134	Forest Reserves, Private.....	23
Fires on Tantalus	72	Forest Resources.....	170, 19
Fish	331	Forest Sermon	
Fishes, Hawaiian	276	Forest Station, Nuuanu.....	
Floral Parade	269	Forfeitures	
Flowers	277	Frear, Governor	8
Fly	382	Frear, Mary Dillingham.....	
Food in the Home.....	470	Froggatt, Mr.....	
Forage	354	<i>Fulgoridea</i>	
Forest, Amazon	203	Fumigation	
Forest Area	354		

G

<i>Galerucella luteola</i>	283	Glanders.....	16, 139, 26
Game Laws	478	Goose, Hawaiian.....	18
Garfield, Hon. James R.....	96	Governor's Message	
Garlic	138	Grapes	
Genge	416	Guava Jelly	
German Ivy	361	Guayule Bush	
Giffard, W. M.....	62	Guinea Pigs	
Gilmore, John W.....	2, 187		

H

<i>Haemaphysalis leporispalustris</i> ..	283	<i>Hippodamia convergens</i>	
<i>Hæmatobia serrata</i>	284	<i>Histerid</i>	
Hall, Mrs. Elizabeth.....	176	Hog Cholera	26
<i>Haplogonatopus mexicanus</i>	284	Homesteads	
Harbors	353	Honey	
Hawaiian Forest	200	Hornfly Parasites	
Hawaiian Pines	245	Horses, Importation of Cavalr	
Hawaiian Rubber Association...	445	Horses, U. S. Cavalry.....	
<i>Heliophila unipuncta</i>	331	Horticulture	
<i>Hemichionaspis minor</i>	206	Household Economics, Course	
<i>Hemilaea vastatrix</i>	207	<i>Hunterellus hookeri</i>	
Hevea Blight	438	<i>Hymencyrtus cæwii</i>	
Hevea or Ceara.....	445	<i>Hymenopteron</i>	
<i>Hippodamia ambigua</i>	284	<i>Hyperaspis silvestrii</i>	

I

<i>Icerya aegyptiaca</i>	284	Inspection, Table of.....	
<i>Icerya sacchari</i>	284	Inter-Crops	
Immigration	147	Irrigated Lands	
Importations destroyed.....	69	Irrigation	3
Incomes, Tax on.....	147	Irrigation Congress.....	245, 343, 40
Industries, Diversified.....	145	Irrigation Publications.....	
Insect Pest Remedies.....	418	Irrigation Water	
Insect Pests	416	<i>Ixodidae</i>	
Insects, Useful.....	360	<i>Ixodiphagus texanus</i>	
Inspection.....	225, 358, 362, 434, 437, 465		

J, K

	PAGE.		PAGE.
James, C. C.....	419	Kohala Forest Reserve.....	471
Japan	411	Kohala Reserve Hearing.....	480
Kilauea	218	Kona Tobacco Co.....	101
Knudsen, Augustus F.....	171, 355	Krauss, Mr. F. G.....	210
Knudsen, Mrs.....	82, 355	Kumuwela Club	163

L

Laboratory, Research.....	218	Lihue-Koloa Forest Reserve.....	236
Lady Birds	285	<i>Lipernes subviridis</i>	284
Land-Grant Colleges	143	<i>Lithocolletis</i>	284
Land Settlement	27, 99, 274	Live Stock, Importation of.....	
Law, Conservation and.....	366	.....	18, 142, 441, 443
<i>Lecanium</i>	284	Live Stock, New Zealand.....	70
<i>Lecanium oleae</i>	284	Live Stock Show.....	354
Leighton, Mr. W. O.....	349	Lumbering in Puna.....	261
<i>Leis conformis</i>	284	Lumpy Jaw	442
<i>Lepidoptera</i>	284	<i>Lycaenidae</i>	284
Lepidosaphes	24	<i>Lymantria</i>	284
<i>Lepidosaphes citricola</i>	284	<i>Lycerosia irritans</i>	284
<i>Lestophonous iceryae</i>	284	<i>Lysiphlebius</i>	284
Library	263		

M

<i>Macrodyctium omiodivorum</i>	284	McQueen, Mr. James.....	342
Makawao Forest Reserve.....	234	<i>Meda testudinaria</i>	284
<i>Malacasoma</i>	284	<i>Megilla vittigera</i>	284
Mallein Test	443	Melon fly	435
Mamane Forest	230	Melon Fly Parasites.....	360
Mammitis	342	Melon Pest, Our.....	281
Mango, A promising.....	367	Mendenhall, W. C.....	372, 385
Mangrove Shoots	24	Meningitis, Cerebro Spinal.....	18
<i>Manihot dichotoma</i>	504	Message, Governor's.....	98
<i>Manihot heptaphylla</i>	504	<i>Microterys flavus</i>	284
<i>Manihot piauhyensis</i>	504	<i>Microzeisea (Pentilia)</i>	284
<i>Margaropus annullatus</i>	284	<i>Midus pygmaeus</i>	284
Marketing Facilities.....	100	<i>Mincola indiginella</i>	284
Marketing Rubber	445	Moloaa Forest Reserve.....	236
Market Requirements	28	<i>Monstera deliciosa</i>	275
Mat-rush	412	Mosquito Powder	348
Mauna Kea Forest Reserve.....	229	Mosquitoes	382
<i>Mayetiola destructor</i>	284	<i>Myiæneme comperi</i>	284
Maze, Oriental	23	Mynah Bird	363

N

Nene	182, 263	Nursery	346, 469
<i>Neuroptera</i>	284	Nursery, Government.....	261
Newell, Hon. F. H.....	26, 95	Nursery Grounds	468
<i>Novius belus</i>	284	Nursery, New local.....	182
<i>Novius cardinalis</i>	284	Nuuanu Station	470
<i>Novius Koebelii</i>	284		

O

Officials, Public.....	146	<i>Omiodes accepta</i>	284
Ohia Lehua	194	Onion Crop, Kauai.....	243
Omachi	411	Onion Culture	211

	PAGE.
<i>Ootetrastichus beatus</i>	284
<i>Ophelosia crawfordi</i>	284
Orange trees	448
<i>Orcus australasia</i>	284

	PAGE.
<i>Orcus chalybeus</i>	284
<i>Opiellus trimaculatus</i>	284
<i>Orthesia insignis</i>	284

P, Q

Papaia	277
<i>Paranagrus optabilis</i>	284
<i>Paranagrus perforator</i>	284
Parasites	339
Parasites, Hornfly	465
<i>Parlatoria zizyphi</i>	285
<i>Parthenium argentatum</i>	270
Peach Scale	70
<i>Perkinsiella saccharicida</i>	285
Pests.....	226, 358, 435, 437
Pests excluded	337
Pests intercepted	465
<i>Phaenacaspis eugeniae</i>	285
Philippine Journal of Science...	120
Philodendron	275
<i>Phlocosinus bicolor</i>	285
<i>Phlocosinus thuyae</i>	285
<i>Phlyctaenia</i>	285
<i>Phyllophagids</i>	285
<i>Phyllosticta</i>	438
<i>Phylloxera</i>	285
<i>Physcus</i>	285
<i>Phytophagous</i>	285
<i>Pieris brassicae</i>	285
<i>Pieris rapae</i>	285
Pinchot, Gifford	95, 377
Pineapples	462
Pineapple Association	245
Pineapple Company, Private....	242
Pineapple Disease	146
Pineapple Outlook	267
Pineapple Scale	338

Pineapple Shipping	152
<i>Pipunculidae</i>	285
<i>Planchonia</i>	285
Plant Breeding	257
Plant Improvement	187
Planting on Haleakala.....	205
<i>Platyomus lividigaster</i>	285
<i>Plusia</i>	285
<i>Poecilidae</i>	331
Pope, Willis T.....	423
<i>Porizon conotracheli</i>	285
Porter, B. E.....	153
Potato	97
Potatoes, Scabby.....	21
Poultry and Profits.....	153
Poultry Association	434 463
Poultry, Exhibition of.....	63
Poultry Raising	73
<i>Prays oleellus</i>	285
Prize Winners	64
<i>Procrustes coriaceus</i>	285
<i>Prospastella berlesei</i>	285
Pruning	449
<i>Pseudococcus nipae</i>	285
<i>Pseudogonatopus</i>	285
<i>Pterophorus</i>	285
Public Lands	1
<i>Pulvinaria mammeae</i>	285
<i>Pulvinaria psidii</i>	285
Pyrethrum powder	348
Quarantine Station	265, 341

R

Railroads	353
<i>Raphidia</i>	285
Rats	159, 382
Rats, How to Destroy.....	384
Reclamation	385
Reclamation Act	405
Reclamation Service	15
Reed, Miss Minnie.....	163
Report, Annual.....	157
Research Laboratory at Kilauea.	218
Reserves, Forest	217
Resolution, Concurrent.....	255
<i>Rhipicephalus texanus</i>	285
<i>Rhizobius</i>	285

<i>Rhizococcus</i>	285
<i>Rhopoides</i>	285
Rice Breeding	415
Rice, Classification of.....	415
Rice Experiments	415
Roads	46
Rock, J. E.....	16
Roosevelt, Theodore.....	97
Rubber Enemies	445
Rubber, Hawaiian	271
Rubber Industry	273
Rubber, Marketing.....	445
Rubber Outlook	79
Rubbers, The New.....	504

S

Salamander	331
Scaevola	503
Scale, Greedy	23
Scale, Snow.....	206

Scales	337
<i>Scolytid</i>	285
Scorpions	134
Scudder, Rev. D.....	6

	PAGE.
<i>Scutellista cyanea</i>	285
<i>Scymnus</i>	285
Seattle	263
Seattle Conservation Congress..	355
Seattle Exhibit	184, 245
Seed Collecting	346
Seed, Cotton	136, 159
Seed, Vegetable	134
See-miu	411
Seminar, Agricultural	15
<i>Serangium</i>	285
Settlement Association.....	39
Settlement, Land	99
Settlers	28
Shanghai	413
Sheep Disease	142
Shelter Tent Tobacco.....	151
Shimriki	411
Shingle, Hon. R. W.....	102
Shipping	267
Shipping, Pineapple	152
Shrub, A new.....	503
<i>Sigalphus curculinis</i>	285

	PAGE.
Silvestri, Dr. E.....	280, 396
Sisal Expansion	228
Small Farmer	445
Smith, C. S., Report.....	51
Smith, Jared G.....	111
Smith, W. O.....	119
Smyrna Fig.....	227, 268
Soil Conservation.....	26
Soils	450
<i>Sophora Chrysophylla</i>	230
Soy Beans	431
<i>Sphaeorstilba coccophila</i>	285
<i>Sphenophorus obscurus</i>	285
<i>Staphylinids</i>	285
<i>Staphylinus oleus</i>	286
Starch, Hawaiian	213
Statistics, Rubber.....	460
<i>Stylopidae</i>	286
Sugar Cane.....	138
Sugar Cane Seedlings.....	15
Sugar Crop	276
Surveys	99
Swanzy, Mrs. F. M.....	200

T, U, V

<i>Tachinidae</i>	286
Taft and Conservation.....	380
Tantalus Forest....	224, 262, 347, 365
Tapping	445
Tax on Incomes.....	147, 186
<i>Teleonemia lantanae</i>	286
Tenney, E. D.....	130
<i>Tetranychus telarus</i>	286
<i>Tetrastichodes</i>	360
<i>Tetrastichus xanthomelanae</i>	286
<i>Thalpochares cocciphaga</i>	286
Thimble Berry	435
<i>Thyridopteryx ephemeraeformis</i> .	286
<i>Tillus formicarius</i>	286
Tobacco, Cuban.....	76
Tobacco, Cultivation of.....	212
Tobacco, Hawaiian.....	76
Tobacco, Shelter Tent.....	151
Tobacco, Sumatra	78
<i>Tomocera californica</i>	286
Torpedo bug parasite.....	338

<i>Toxoptera graminum</i>	286
Transportation	27, 48, 352
Tree Distribution	134, 344
Tree Planting	185, 225
Tree Planting Bulletin.....	433
Tree Planting Contest.....	433
Trees at Nursery.....	470
<i>Trichogramma pretiosa</i>	286
<i>Tripetidae</i>	286
<i>Trithionyx lanosus</i>	286
<i>Tuberculosis</i>	439
Turner, L. F.....	445
Turnip Maggots	24
<i>Tyroglyphus phylloxerae</i>	286
Use of Water.....	397
Vegetables	228, 244, 257
<i>Verania frenata</i>	286
<i>Verania lineola</i>	286
Volcano Laboratory	276

W, X, Y

Wages in Cuba.....	179
Wahiawa, Forest Fire.....	134
Waihou Spring Forest Reserve..	232
Waianae-Uka	204
Waldron, F. L.....	445
Water Conservation	26
Water Resources	130, 349
Water Springs	16
Water Supply	372
Waterhouse, F. T. P.....	445
White Fly Enemy.....	338
Wong, Dr. E. V.....	116, 394, 445

Woman's Congress.....	158
Woman's Rivers and Harbors Congress	259
Women's Conservation Meeting.	81
Wood, Cord of.....	209
Wood Finishing	423
Woods, Hawaiian.....	101
Workers, Farmers' Institute....	258
<i>Xylophagous</i>	286
Yams	138

	PAGE.
Philippine Journal of Science, The.....	120
Pineapple Outlook	267
Pineapple Shipping Experiments	152
Possibilities of Fig Cultivation.....	268
Potato Opportunity	97
Poultry and Profits	153
Poultry Raising in Hawaii.....	73
Principles of Plant Improvement.....	187
Proper Use of Water in Irrigation, The.....	397
Proposed Volcano Laboratory	276
Quotation from the Hawaiian Planters' Monthly for May...	286
Reclamation Act	406
Remarks by Mr. R. S. Hosmer, before the Hawaiian Rubber Association	453
Report of the Advisory Land Law Commission.....	37
Research Laboratory at Kilauea.....	218
Resignation of Mr. W. M. Giffard.....	62
Revised Farmers' Bulletin.....	56
Rubber Convention	445
Rubber in Hawaii, 1905-10.....	456
Rubber Statistics	460
Seattle Conservation Congress	355
Seattle Live Stock Show.....	354
Shelter Tent Tobacco	151
Shipping of 1908.....	267
Spirit of Conservation in the Home, The.....	160
Strength Tests of Ohia Lehua.....	194
Suggestions from the Kauluwela Club.....	163
Survey of the Actual State of Agricultural Entomology in the United States of North America.....	287
Tantalus Forest	365
Territorial Water Supply	372
Value of the Hawaiian Forest, The.....	200
Waihou Spring Forest Reserve, The.....	232
Water Resources of Hawaii.....	349
Women of Hawaii's Conservation Meeting.....	81
Woman's National Rivers and Harbors Congress.....	158
Woman's Rivers and Harbors Congress.....	259
Wood Finishing	423

INDEX

A

	PAGE.	
<i>Ablerus</i>	282	<i>Aonidiella aurantii</i>
<i>Acaridae</i>	282	<i>Apanteles glomeratus</i>
Acid Phosphate	419	<i>Aphanomerus pusillus</i>
<i>Acridotheres tristis</i>	330	<i>Aphelinus mytilaspidis</i>
Actinomycosis	442	<i>Aphis brassicae</i>
Advisory Land Law Commission	37	<i>Aphis papaveris</i>
<i>Ageniaspis</i>	282	<i>Apis lingustica</i>
Agriculture, Course in.....	7	<i>Apis mellifica</i>
Agricultural Research	15	<i>Aporia</i>
<i>Agromyza</i>	282	Arbor Day.....344, 39.
Alaskan Exposition.....31, 101, 144		<i>Archenomus bicolor</i>
<i>Aleyrodes brassicae</i>	282	Art and Design, Course in
Alfalfa	132	<i>Asphondylia lupini</i>
Alfalfa, Irrigation of.....	452	<i>Astragalus sinicus</i>
Algaroba Beans	363	<i>Aspidiotus</i>
Algaroba Caterpillar	361	<i>Aspidiotus hederæ</i>
<i>Anagrus</i>	282	<i>Aspidiotus perniciosus</i>
<i>Anaphes</i>	282	<i>Aulacaspis pentagona</i>
<i>Anastrepha fratercula</i>	282	Austin, C. J.....
Anderson, W. A.....	445	Avocado mealy bug.....
Annual Report	157	Avocado Pear.....
<i>Anthronomus grandis</i>	282	

B

Banana, Crystallized.....	348	Birds
Bananas	136	Birds, Beneficial.....
Banyan	121	<i>Blastophaga</i>
Bee Culture	56	<i>Blastophaga grossorum</i> ...
Beekeepers' Association.....	32	<i>Blastophagus piniperda</i>
Beekeeping	213	Blights
Bee Plants	32	Boll Weevil Problem.....
Beet, Sugar	132	<i>Bombus</i>
Beetle, Japanese	435	<i>Bombus hortorum</i>
Beetles	337	<i>Bombus terrestris</i>
Beetles, Bark	25	Botanical Collection
Beneficial Birds	186	Botanical Trip
Bird Introduction	168	Braconid
Bird Law	263	Brown, C. A.....
Bird Reservation	148	

C

Calcium Cyanamide	179	<i>Carassius auratus</i>
<i>Calosoma sycophanta</i>	282	<i>Carpocapsa</i>
Canton	411	Carter, A. W., Report....
<i>Carabids</i>	282	Carter, Hon. G. R.....
<i>Carabus aurantus</i>	282	<i>Casoecia</i>

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No. 1

Without question the most important internal problem in Hawaii is the wise use of the public lands. No other approaches it in scope or influence. Every phase of life in the islands depends in the last analysis on the right use of these lands. Consequently any thoughtful contribution to a better understanding of this complex subject is heartily to be welcomed. The report of the Advisory Land Law Commission, appointed last summer by Governor Frear, is decidedly such a contribution. That it may be more widely read and perhaps come to the hands of some whom it might not otherwise reach, this report is reprinted in full in this number of the FORESTER. It should receive the careful attention that the subject of which it treats so well deserves.

The attention of readers of the FORESTER is particularly directed to the valuable contribution in this number, by Professor John W. Gilmore, upon the work and outlook of the College of Hawaii. All who are interested in the development of the Territory and in its upbuilding from within, by the creation of efficient practical workers in agricultural technical and home pursuits, among those who have learned to call the Hawaiian Islands their home, will find in the following pages much that is helpful and instructive.

This number presents the address delivered by the Hon. F. H. Newell before the Territorial Conservation Commission of Hawaii. During his recent visit to the islands the eminent Director of the United States Reclamation Service made a close study of such local conditions as touch soil and water conservation and land settlement. His conclusions as set forth elsewhere in this number deserve close attention. It is gratifying to be told from such an authority that the opportunities offered the settler in these islands are superior to many that have been accepted in the West.

The annual meeting of the Hawaiian Beekeepers' Association is noted at length in this issue. Although representing one of our smallest industries, the beekeepers with regard to organization and activity show a commendable example to other and larger agricultural interests.

THE COLLEGE OF HAWAII: ITS WORK AND OUTLOOK.

By John W. Gilmore.

To those of us who have been more or less intimately associated with the establishment of the College, a review of the process by which it came into being, and the foundations upon which it rests may seem superfluous, but for the sake of those who may not be familiar with these things, I may be permitted to refer briefly to the history of the agitation for colleges to foster the study of and instruction in common things.

The College of Hawaii falls in chronological order as sixty-sixth of the institutes established by the Land Grant Act of 1862. This act, which no doubt is the greatest land mark in the history of education in any land or in any age was not the result of a single legislature. Agitation for instruction in the practical activities of life began with the first administration of Washington. As the smoke of the Revolution cleared away the nation began to feel for its implements of industry and progress and began to use them with efficiency and intelligence. Levoisier's discoveries had awakened an interest in the relations of chemistry to crop production, and people were beginning to see that even the knowledge of that day had application to the industries. Washington, in his far-sighted wisdom, advocated in his first message to Congress (Jan. 8, 1790) attention to the "advancement of agriculture, commerce and manufactures by all proper means" and he left it to the deliberations of Congress whether this should be done by the agency of a national university or by other expedients. Meantime agricultural societies had been established and they were promoting the interests of agriculture as best they could. The Agriculture Societies led to fairs and exhibitions and these in turn led to the importation of pure blooded animals and better plants. It is interesting to note in this connection that practically all our crops and domestic animals save the turkeys and peaches and apples and tomatoes have been imported.

... scientific and technical education grew
... of adding the impetus of scholarship and
... methods of the common affairs of life was magnified.
... Colleg ... appointed in 1792 Samuel L.
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... instead of occupying a
... one subject, as is now
... the bench. It was not
... agricultural college
... bria County, New York.
... for manual training and

the school was equipped with a farm where the students could support themselves by manual labor while pursuing their studies.

The first appropriations by the State for the teaching of agriculture was that of a sum of \$4,000, voted by the New York legislature for Ovid Academy in Seneca County. This school, however, failed in its operation. The first Agricultural College to be established and put in operation was that of the State of Michigan. The constitution of that State, adopted in 1850, says, "The legislature shall encourage the promotion of intellectual, scientific and agricultural improvement; and shall, as soon as practicable, provide for the establishment of an agricultural school."

The Act establishing the Michigan Agricultural College was passed Feb. 12, 1855, and the college was opened for work in May, 1857. The Maryland Agricultural College was the next to come into action in 1859, and shortly afterwards in the winter of the same year, the Pennsylvania State College was established.

As a counter part in the educational needs of the time, scientific schools were established at Yale and Harvard between 1840 and 1850—the Lawrence Scientific School at Harvard in 1846 and the Sheffield Scientific School at Yale about the same time. The Lawrence Scientific School was established particularly for the purposes of instruction in the Mechanic Arts and the application of chemistry to manufacture.

The rise of the College of Agriculture and Mechanic Arts brings up an interesting contrast between our estimate of objects fit for study now and of former times. The time was when men busied themselves with studies and speculations concerning the universe, alchemy, astrology and sooth saying were fields of mental activities. Afterwards the stars were seen in motion and parallax and astronomy was born. Linnæus found that plants and animals differed and at the same time had certain traits in common, then biology came into being. Speculation grew up respecting the shape, size and position of the earth and the continents of North and South America were discovered. When Davy discovered the circulation of the blood most men admitted that the "greatest study for mankind is man," then came the university. But the progenitor of man is the son and the daughter, and this is the impulse of the public schools. We are now on the ground and people are recognizing one another and the things about them.

This brief history has been entered into in order to show that the time was ripe for action by the Federal Congress, when Senator Justin S. Morrill of Vermont began his agitations in the Buchanan administration in 1857. His first attempt to get the need for collegiate instruction in agriculture

and the mechanic arts recognized by the Federal Legislature failed, but although the country was soon plunged into a bitter war, he renewed his efforts, believing as he did that when peace should come the country would respond as never before to the call of these leading industries. In December, 1861, he introduced a new bill more far reaching than the first one, bestowing 30,000 acres of land for each member of congress upon the several States and Territories for "the endowment, support and maintenance of at least one college where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

This bill was passed and signed by President Lincoln on July 2, 1862, the day of McClellan's retreat after the battle of Malvern Hill. This is a remarkable grant, coming at the time it did, the greatest ever made to education. It was the foundation of industrial education in America, and represented the consummation of a notable change in the systems of higher learning.

Thus was the College of Hawaii founded, on a broad and liberal basis both as to scholarship courses of study and the democracy among its students. And it is the fondest hope of its Board of Regents, and its faculty that it may develop along the lines so broadly laid out for it. With the paragraph of the Act of 1862, just read, in mind, it is pertinent to note several considerations as they bear on the activities of the College. In the first place, it is well to remember that the Land Grant Colleges were not endowed for the purpose of teaching agriculture alone. Their object was to give an opportunity for all young men and women engaged in the industrial activities to gain a knowledge of the practical sciences applied to their respective industries. Practically two-thirds of all our people are engaged in the three great activities of Agriculture, the Mechanic Arts and Home Making, yet before the establishment of these colleges these citizens had no opportunity to acquire scientific knowledge in those subjects that pertained to them. Furthermore, it is not necessarily intended that those engaged in agriculture shall be farmers, or that those engaged in engineering shall be mechanics. The College affords an opportunity to become so if they wish, and to become so is the main object is to teach those sciences and to apply them to these broad activities. The end that the educated men and women. In other words, the equal training of all citizens is the consideration and

In the second place a liberal education is provided for. Classical studies were not to be excluded from the curriculum. Experience in the handling of tools and implements in manual labor is not to be disparaged. In their time and place they are not to be neglected, but they should not largely interfere with the time required for the large amount of scientific and literary culture, which go to make up a liberal education. The College therefore, is not merely a practical school of agriculture and mechanic arts, but it fosters a liberal education as well.

Then again we would note that the College is established for the scientific and liberal education of the *industrial* classes who had not been sufficiently provided for in the old established classical colleges. These, as a general rule, were patronized by the sons of the wealthy who usually became literary men, teachers, preachers, lawyers, physicians or men of leisure. There is a demand for an education in terms of the common things with which men and women earn their living and the College of Hawaii is designed to fill this gap, not only in respect to subjects taught but also in respect to their application to the conditions in Hawaii.

These colleges established another new principle in education in America, the principle of free tuition in the highest schools of learning. Liberal education is a necessity in a free government; heretofore only the sons of the rich were able to get it. A government of the people, for the people and by the people can be perpetuated only by educating all the people. It is not sufficient that we have in America a magnificent system of common schools. The highest education must be within the reach of all the worthy poor.

The College of Hawaii, though established by virtue of the Land Grant Act of 1862, as indicated above, yet it does not benefit directly by that Act. The provisions of the law were among other things that 30,000 acres of land should be set aside for each Senator and Representative then in Congress, and the Colleges were to be established from the proceeds of the sale of these lands. Hawaii, being a Territory cannot have this same land grant.

By the year 1890 it had become evident that the proceeds from the sale of these lands was insufficient for the support of the Colleges then established in most of the States. They had outgrown their resources. Senator Morrill in that year introduced a bill in Congress providing for an additional grant of \$25,000 a year to each of the Colleges then established and this bill became law. This was a great relief to those colleges growing beyond their means and a great boon to the cause of education in the more thinly populated States, so they all continued to grow until in 1907 it was found that they were again growing beyond their means. In that year Senator Nelson of

Minnesota introduced a bill augmenting the appropriations of 1890 by \$5,000 for that year to be increased by \$5,000 for each succeeding year until the total should amount to \$25,000. This bill became law. The College of Hawaii benefits by both the Federal Acts of 1890 and 1907, so that by virtue of them we are receiving this year \$35,000 and this amount will be augmented each year by \$5,000 until the year 1911-12, when we shall be receiving from these sources \$50,000.

In regard to the expending of these funds it is important to note that they or no part of them can be spent for the purchase of lands, the erection or repair of buildings or for the furniture or fixtures of buildings. They may be spent only for the payment of salaries for instruction in certain specified subjects that pertain to agriculture, the mechanic arts and domestic science, and for the books, apparatus and materials of illustrating used in the teaching of these subjects. They may not be spent for teaching any other language than English, nor for the teaching of such subjects as psychology, logic, ethics or history.

It is plain from this then, that Hawaii having accepted these funds for the purpose designated, it has also a duty to perform in providing the land, buildings and moneys for current expenses. So far the Legislature has met these demands well. At the last session \$25,000 was appropriated for the biennium now drawing to a close in three sums, \$10,000 for buildings, \$10,000 for salaries and \$5,000 for incidental expenses, including equipment. At the time of the appropriation I believe it was not known that the Federal Grant would be secured, so not enough was appropriated for buildings, as we are now urgently in need of room. We have also secured about 43 acres of land for a campus in one of the most beautiful valleys in the suburbs of Honolulu and negotiations are under way for considerable more land. When these lands are secured, when the necessary buildings are built and when the campus is laid out we will have one of the most beautiful College grounds in the country. Moreover our equipment will be among the most adequate. We shall have facilities for instruction, both in agriculture and engineering that will be unsurpassed.

At the present time the College is housed in two temporary buildings, both inadequate in size and accommodations. One is an old building and the other is new. The new one was constructed with a view of moving it to the permanent site when we shall have become established there. These buildings are inadequate and especially in respect to room for laboratory purposes. The College has advertised courses in engineering that require machinery equipment. Yet we have no place to put the equipment. Our chemical laboratory is too small and we have no physics laboratory at all.

Instead of the one course advertised in the prospectus issued last year, we are now offering four courses leading to the Bachelors degree; namely, a course of four years in Agriculture and similar courses in Engineering, Home Economics and General Science. In addition to these courses, students properly qualified in age and preparation may come in and take special work in any subject that the College is prepared to offer. This privilege is designed to offer students who may not wish to graduate to pursue special studies in such subjects as Sugar Chemistry, Bacteriology, Crop Production, Hydraulics and the like. To be admitted to the regular courses students must have graduated from an accredited High School, or preparatory school, and must be at least sixteen years of age. If special students they must be at least eighteen years of age.

COURSE IN AGRICULTURE.

FIRST YEAR.

First Semester.		Second Semester.	
	Credits		Credits
Advanced Algebra.....	3	Trigonometry	3
Chemistry	3	Chemistry	3
English	4	English	4
Botany	4	Botany	4
German or French.....	3	German and French.....	3
Drawing	3	Drawing	3
<hr/>		<hr/>	
Total	20	Total	20

SECOND YEAR.

English	3	English	3
Chemistry (Oral Anal.)....	3	Chemistry (Organic).....	4
Zoölogy (Invertebrate).....	3	Zoölogy (Vertebrate).....	3
German or French.....	3	German or French.....	3
Physics	5	Plant Propagation.....	3
Surveying	3	Geology	4
<hr/>		<hr/>	
Total	20	Total	20

THIRD YEAR.

Agricultural Chemistry.....	3	Agricultural Chemistry....	3
Agronomy and Soils.....	4	Agronomy	4
Bacteriology	4	Animal Husbandry.....	4
Animal Husbandry.....	4	Forging	1
Horticulture	4	Physiology	3
Wood Work.....	1	Entomology	3-5
<hr/>		Elective	0-2
Total	20	<hr/>	
		Total	20

FOURTH YEAR.

Economics	4	Economics	4
History	4	History	4
Farm and Estate Management	4	Rural Engineering	4
Electives	8	Electives	8
	—		—
Total	20	Total	20

COURSE IN ENGINEERING.

FIRST YEAR.

First Semester.		Second Semester.	
	Credits		Credits
English	4	English	4
German or French	3	German or French	3
Rhetoricals	1	Rhetoricals	1
Rev. Alg. Geom. and Trig.	5	Analytical Geom.	5
Chemistry	3	Chemistry	3
Drawing	3	Drawing	3
Pattern Making	2	Pattern Making	2
	—		—
Total	21	Total	21

SECOND YEAR.

English	3	English	3
German or French	3	German or French	3
Physics (General)	3	Physics (General)	3
Calculus (Differential)	3	Calculus (Integral)	3
Chemistry (Qual. Anal.)	2	Descriptive Geom.	2
Surveying	3	Surveying	3
Drawing	3	Drawing	3
Foundry Practice	2	Forging	2
	—		—
Total	22	Total	22

THIRD YEAR.

Mechanics (Elem.)	4	Mechanics (Analytical)	5
Materials	3	Materials and Metallurgy	3
Kinematics	4	Machine Design	4
Chemistry	3	Physics Lab	3
Steam Machinery		Electrical Machinery	4
Mechanical Lab		Mechanical Lab	2
Machine Shop		Machine Shop	2
			—
			23

Steam Gas and Oil Engines	5
Steam Plant Design	3
Engineering Economics	3
Power Plant Testing	2
Spec. and Contract	2
Elective	5
	—
...	20

COURSE IN CIVIL ENGINEERING.

THIRD YEAR.

First Semester.	Credits	Second Semester.	Credits
Mechanics (Elem.).....	4	Mechanics Analytics.....	5
Materials	3	Materials and Metallurgy..	3
Geology	3	Astronomy	3
Structural Design.....	3	Bridge Design.....	3
Surveying	3	Surveying	3
Drawing	4	Drawing	4
	<hr/>		<hr/>
Total	20	Total	21

FOURTH YEAR.

Hydraulics	5	Irrigation Eng.....	5
Sanitary Engineering.....	3	Municipal Eng.....	3
Surveying	3	Roads and Highways.....	3
Engineering Lab.....	3	Concrete and Masonry	
Forestry	3	Structure	3
Electives	3	Water Supply.....	3
	<hr/>	Electives	3
Total	20		<hr/>
		Total	20

COURSE IN ELECTRICAL ENGINEERING.

FOURTH YEAR.

First Semester.	Credits	Second Semester.	Credits
Thermo Dynamics.....	5	Steam, Gas and Oil Engines	5
Electrical Mach. and De-		Elec. Power Plant Design..	3
signs	3	Engineering Economics....	3
Dynamo Lab.....	4	Electro., Chem. and Metal-	
Hydraulics	3	lurgy	3
Electives	5	H. P. Testing and Trans..	3
	<hr/>	Electives	3
Total	20		<hr/>
		Total	20

COURSE IN HOUSEHOLD ECONOMICS.

FIRST YEAR.

First Semester.	Credits	Second Semester.	Credits
Adv. Algebra.....	3	English	4
English	3	Chemistry	3
Botany	4	German or French.....	3
German or French.....	3	Botany	4
Pencil and Charcoal Drawing	2	Freehand Drawing.....	2
Chemistry	3	Hygiene and Sanitation....	2
	<hr/>		<hr/>
Total	18	Total	18

SECOND YEAR.

German or French.....	3	German or French....:	3
Chemistry (Qualitative)....	3	Chemistry (Organic).....	4
Color, Theory and Technique	2	Selection and Preparaton of	
English	3	Food	3
Zoölogy	3	English	3
Textiles	3	Color, Theory and Tech-	
Physics	3	nique	2
	—	History of Architecture....	1
Total	20	Entomology	3
			—
		Total	19

THIRD YEAR.

Food Chemistry.....	3	Food Chemistry.....	3
Bacteriology	4	Dietetics	4
Uses of Food.....	3	Home Decoration.....	2
Home Architecture.....	3	Economics	4
Economics	4	Trigonometry	3
Ceramics	2	Physiology	3
History of Art.....	1	Ceramics	2
	—		—
Total	20	Total	21

FOURTH YEAR.

History	4	Teachers' Course.....	2
Food and Nutrition.....	5	Household Management....	3
History of Home Economy..	2	Logic	3
Psychology	3	Electives	4
Electives	6		—
	—	Total	12
Total	20		

Electives—Languages, Composition
and Design, Arts and Crafts.

Electives—Composition and Design,
Arts and Crafts.

COURSE IN ART AND DESIGN.

FIRST YEAR.

First Semester.		Second Semester.	
	Credits		Credits
		Drawing	2
		Color, Theory and Tech-	
		nique,	2
		History of Architecture	1
			—
			3
		Design	1
		Painting	2
			—
			3

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FOURTH YEAR.

Composition and Design....	2	Composition and Design....	2
Arts and Crafts.....	2	Arts and Crafts.....	2
	<hr/>		<hr/>
Total	4	Total	4

You will note that the College year is divided into two semesters instead of the usual three terms. This arrangement has its special advantage in that it may be taught thoroughly. Next year the semesters will be so arranged that the first semester will close with the beginning of the Christmas holidays. Thus with no extensive holidays at Thanksgiving or Easter, the term's work will not be broken into. Then subjects included in these courses are designed to give the most practical instruction; at the same time the course as a whole throughout its four years is designed to give a liberal education. In this connection note that the subjects of German and English run through two years of the course. It is held that thorough instruction in English is one of the greatest needs in the instruction of young people today, and no student should go through College today without a reading knowledge of a modern European language. Moreover the student is given a thorough grounding in mathematics and the fundamental sciences before he takes up the more technical subjects. In respect to class work, the subjects are so arranged that there is a sufficient amount of laboratory work to enable the student to become familiar with the manipulation of the materials with which he has to work, and the principles involved in their construction or arrangement. They are designed, however, not so much to afford manual skill as to impart intellectual training.

The course in Engineering is arranged so that the student may become proficient in one of three different branches of the profession, namely Mechanical Engineering, Civil Engineering and Electrical Engineering. The work for the Electrical Engineer is the same as that for the Mechanical Engineer in all but the fourth year. In this year he specializes in those subjects bearing especially on the field of Electrical Engineering. The Civil Engineer follows the same course as the mechanicals in the first two years of his course, but in the last two he takes those subjects that pertain especially to Civil Engineering.

In the course in Household Economics, in addition to the cultural subjects, those subjects are included that have a special bearing on the home and the economics of its management. These are self-explanatory.

In addition to these courses the College is now offering instruction in the subjects of Chemistry and Physics as applied to everyday life, Domestic Science, Freehand Drawing and

German Literature. These subjects are offered in the afternoon and are open to all who care to attend. In a short time the College will offer in a series of evening lectures the subjects of Agriculture, Animal Husbandry, Poultry Industry, Horticulture, Botany and the like.

The College is now offering instruction to more than ninety students in all courses. Four are in the regular college courses, five are preparing, twenty are in special courses, and the remainder are attending the afternoon lectures.

In the administration of the College and its affairs certain ideals must be formulated and striven for. Among these it may be mentioned that as we see it, the College finds its special province in offering to the young men and women of the Territory a higher training in the practical affairs of life that they would otherwise have to go to the mainland to secure. Of course if a student has the means and the privileges of going to one of the Eastern colleges for his education he will derive much benefit from going, but there are many in our midst who have neither the means nor the privileges of going away for their College education, and it is these that the College stands ready to help and that without tuition. Moreover, our Territory possesses unique resources for instruction in agriculture and engineering. Although we are situated in the tropics, yet we have a climate that is conducive to study. Our environment is replete with problems and lessons in agriculture. The largest and best managed sugar and pineapple plantations in the world exist here, and with sentiment crystalizing as it is, it will not be many years before the interests and activities of the small farm holdings will be quite as important as anywhere on the mainland. Our climate is such as to cause change in both plants and insects. One of our greatest and most economic problems lies in developing economic plants by breeding and selection, that will be adapted to our climate, soil, and economic conditions.

In lines of engineering endeavor our environs are not lacking. Our sugar factories, iron works, railroads and electric lines offer many problems and lessons in this field of activity. Civil, hydraulic and sanitary engineering are being carried into. The country needs leaders who have been educated in their midst and who are familiar with their relationships to other

of subjects with which men progress is attained have elapsed very long since it was in terms of the classical, that whatever might be attained by matter of skill and broken down

as our own community affords instances of men and women educated in terms of practical affairs of life who are taking their place in the community in respect to its progress and development. The main difficulty that confronts this point of view is the reduction of these practical subjects to pedagogical form in order to give them teaching and training value. When this is done, students may be trained by the subjects of engines, soils and wheat, as well as by Greek Philosophy and Mathematics.

In the third place the College fosters an education for service. This ideal is the impulse and mainspring of a useful life. Much may be said in favor of an education for culture or an education for scholarship, but when these motives are combined with an ardent desire for service, the Territory will receive adequate returns for its expenditures. The spirit is manifested by many of our young people and is promoted by some of our educational institutions, that a college education should lift one above work, that overalls and apron are marks of rank that has been left behind and is to be looked down upon. But if a college education does not fit one for the harder tasks of life and more of them it has not manifested its highest ideals.

In order to attain to this ideal the student must be educated in terms of the things with which he lives; and the vast majority of us must live with common things and activities. The boy who may find his calling in the line of trade and transportation, may be educated for this calling in terms of ships, railroads, freight rates and the like. The girl who expects to take a hand in home making (and few do not) may find her education in the sciences of foods and their preparation, and in the arts of home construction and beautifying. The boy of the soil can be educated by agriculture for agriculture and the various other callings which his community demands of him. Educating by means of the subjects close at hand therefore brings the student into intimate acquaintance with his own life. The true end and aim of education is to prepare men and women to live and to be productive, and he or she lives best and fullest who is in closest touch with the things and activities nearest about them and with which they are most closely associated.

Finally it is the aim of the college to produce men who have the power to solve problems—men who shall originate, not merely execute. It is power that counts, and knowledge gives power.

Education is the most important of interests, for it is the path to the highest power, the worthiest ideals, the truest freedom; without it man can seldom reach the highest possibilities that are his.

**BOARD OF COMMISSIONERS OF AGRICULTURE
AND FORESTRY.**

Division of Forestry.

REPORT OF THE SUPERINTENDENT OF FORESTRY.

Honolulu, January 5, 1909.

*Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.*

Gentlemen: I have the honor to submit the routine report of the Division of Forestry for the period from September 16th to date.

The points of special interest during this period may be summarized as follows:

During the month of October, at the invitation of the Governor, it was my good fortune to accompany Governor Frear and Hon. F. H. Newell, Director of the United States Reclamation Service, in their visits to the Islands of Molokai and Kauai. On both of these excursions I was able to gain much information from conversations with Mr. Newell, which is of value to me in my forest reserve work.

After my return to Honolulu and before the departure of the Governor for Washington on November 15th, I was engaged in the preparation of the preliminary report of the Territorial Conservation Commission which was handed to the Governor before his departure. Being chairman of this Commission the duty of preparing the text of the report devolved on me. Early in the month of November papers for delivery at the annual meeting of the Hawaiian Sugar Planters' Association, and at the second annual meeting of the Hawaiian Rubber Growers' Association, held respectively on November 11th and on November 18th, were prepared and read.

From December 1st to December 17th, I was engaged in a trip to the District of Puna, Island of Hawaii, to investigate the forest in that district in connection with an application for a grant of rights made by the Hawaiian Mahogany Lumber Co. in connection with that project. In the course

n October 1908 the National Mountain Forest Survey Board. After being considered by the survey it was referred back to the Territorial Survey Office. This project now awaits the approval of the Territorial Survey Office.

Hawaii I have been engaged with
preparation of the Annual Report of the
and its administrative details.

It may perhaps be noted here that the report of the Conservation Commission was published in the December Forester and Agriculturist, which number also contains an account of the annual meeting of the Rubber Growers' Association. Extra copies were printed and have been generally distributed to members of other State Conservation Commissions and to other persons likely to be interested.

Arbor Day was observed on November 13, 1908. The special feature in regard to this day so far as the Division of Forestry is concerned was the distribution for planting by the public schools, of the largest number of trees ever sent out for Arbor Day planting from the Government Nursery; 71 schools being supplied, the total number of plants being 5,777. At the suggestion of this office Arbor Day planting this year was along the roadsides leading to the schools. Also in connection with Arbor Day, trees have been very generally distributed to homesteaders throughout the Territory without charge. Owing to the unfavorable season some of the plants are still at the Nursery, but these will shortly be disposed of.

During the past two or three months notable progress has been made at the experimental garden in Makiki Valley. Various valuable exotic plants received during the past year have now been planted out. Many of these will unquestionably prove to be desirable introductions to the Hawaiian flora. The reports of Mr. Haughs have given the details of other work carried on in the section of Forest Extension.

SEMINAR OF AGRICULTURAL WORKERS.

With the purpose of bringing the agricultural workers at the several experiment stations in Honolulu into closer touch, there has been organized an informal seminar which meets monthly at one or another of the stations for the promotion of interest in scientific work through the reading of reports and discussion. Four such meetings have been held, respectively on the first Tuesday of October, November, December and January. At the first meeting, President Gilmore of the College of Hawaii outlined the program of studies to be carried on in that institution and told in detail the objects and purposes of the College. Mr. W. A. Bryan also spoke on the organization and plans of the Pacific Scientific Institution. At the November meeting Hon. F. H. Newell spoke on the "Work of the Reclamation Service." He was followed by Dr. Wilcox of the Hawaii Experiment Station who discussed the subject, "What is Agricultural Research?" At the December meeting Mr. Noel Deerr of the Hawaiian Sugar Planters' Experiment Station read a paper on "Methods Used in Originating New Varieties of Sugar Cane Seedlings." The January meeting was held at the Hawaiian Sugar Planters' Experi-

ment Station, when Prof. C. H. Hitchcock addressed the Seminar on the subject of "Fresh Water Springs in the Ocean." The first three seminars were held in the office of this Board. At each one there has been an attendance of over thirty persons. The seminars are open to all members of the staffs of the several Experiment Stations and to persons directly engaged in the teaching of agriculture.

PERSONNEL.

On October 12th, Mr. J. F. Rock was appointed Botanical Collector to gather herbarium material in the native forest and to undertake a collection of seed of rare Hawaiian trees and shrubs needed for exchange. Miss Melika Peterson, who had been away on a leave of absence during the calendar year 1908, returned to her duties with the opening of the calendar year 1909. Mr. R. Irwin, who had been substituting as clerk and stenographer for the Board since August, terminated his services on December 31, 1908.

MEETINGS.

During the past three months the Library of the Board has been used for meetings of various organizations, as follows:

Hawaiian Poultry Association, October 14 and November 27.

Palolo and Kaimuki Improvement Association, Nov. 27.

Very respectfully,

RALPH S. HOSMER,

Superintendent of Forestry.

Division of Animal Industry.

REPORT OF THE TERRITORIAL VETERINARIAN.

January 13, 1909.

Mr. President and Members of the Board:

I beg to report as follows on the work of the Division of Animal Industry since the last meeting of this Board on December 4th, 1908:

Glanders.—Two cases of glanders have occurred in Honolulu since the last meeting; one was a case of a gray gelding which was found standing in the river near Vineyard street

and which belonged to one Japanese by the name of Nomura of the Hawaiian Ballast Company. The animal was taken to the quarantine station at Kalihi and destroyed. It was suffering from extensive farcy of the left hind leg, but showed no symptoms of nasal glanders. The owner, for whom I have already destroyed a number of cases of glanders, claimed that he did not know that an animal could have glanders without nasal lesions, and on this pretext was allowed to escape prosecution for failing to report the case to this office.

Another case of glanders belonging to Mr. Stodford, living on 9th Avenue, in Kaimuki, was reported to this office by one Mr. Pottie. The animal was found to be suffering from typical nasal glanders and was taken to the animal quarantine station and destroyed. Mr. Stodford had bought the animal about a month previous from a hackdriver, name Lee Sin, and as there was no doubt in my mind that Lee Sin must have known at the time that the animal was affected with glanders, the matter was laid before the Attorney General, who prepared a warrant for the arrest of Lee Sin. This warrant was taken to the County Attorney's office together with a full statement of all the circumstances pertaining to the case, but while this is about a month ago, nothing has to my knowledge been done so far in the matter of prosecuting the seller of the glandered animal.

From the Island of Hawaii Dr. Elliot reports several cases of glanders in both plantation and private stables. Dr. Elliot has a number of suspects in quarantine and has been supplied with mallein for the testing of them.

From Maui Dr. Fitzgerald reports glanders in five different localities, three of which are plantation stables. He has been supplied with several hundred doses of mallein and has tested a great number of animals, both on plantations and ranches, as well as in private stables during the past month.

Endemic Catarrhal Fever.—Dr. Elliot reports a very extensive outbreak of this dangerous disease, a full description of which will appear in the next annual report of this Division. The disease manifests itself in various forms ranging from common strangles or distemper to laryngitis and pneumonia and sometimes assuming the form of multiple abscesses. Unless discovered in time the course of the disease is very likely to terminate fatally. This disease has appeared in several plantation stables, both in the Hilo district and in Kau, as many as 60 cases being found in one stable. The same disease has been very prevalent on two of the large ranches on the island of Hawaii, and has caused the loss of valuable animals as well as a great deal of inconvenience and expenses, to say nothing of the set back in development suffered by the numerous affected animals.

Cerebro Spinal Meningitis.—Dr. Fitzgerald reports quite an extensive outbreak of this disease in two plantation stables on Maui. Several animals have died and he has found it a very difficult disease to deal with. I have supplied him with such advice and information as was at my disposal, but have to admit that both treatment and prophylaxis give very unsatisfactory results. In most cases, when the animal does not die during the first stages of the disease, it terminates with a paralysis of the pharynx which generally causes the death of the animal through starvation or through pneumonia caused by the entrance of particles of food into the lungs through the paralyzed pharynx.

Importation of Live Stock.—Several shipments of mules arrived during last month and the beginning of this month, both at this port and at Hilo. All were submitted to the three weeks' quarantine as prescribed by the rules of this Board.

On January 3d the British steamer "Den of Ruthven" arrived with the first consignment of live stock from New Zealand.

The same consisted of 13 Shorthorn bulls and 4 Hereford bulls, all registered stock. Besides the cattle the steamer had on board 40 ewes and 65 rams, all pure bred Merinos.

One bull had to be shot on account of a broken leg, but otherwise all of the animals arrived here in fine condition.

The sheep were loaded directly from the steamer into three double-deck trucks and taken to the quarantine station in Kalihi, while the bulls were driven by cowboys to the quarantine station on the Beach Road.

The bulls will be kept in quarantine for 90 days from the date they left New Zealand, that is up to March 18th of this year. The rams will only be held for 15 days from the date of arrival, that is until January 18th.

All of the bulls are fine animals and will undoubtedly assist materially in the improvement of the live stock of the Territory. While the sheep, which are an extra fine lot, some of the males will help to increase the wool clip on the islands destined to be wool producing.

The following is a list of the animals as follows:

13 bulls for the Railroad

4 Hereford bulls for the Hale Ranch.

40 ewes and 65 rams for the Hamuula

1 bull for the Lanai.

1 bull for the Lanai.

1 bull for the Lanai.

All of the animals are doing well and are rapidly recovering from the effects of the 16 days' trip from New Zealand.

Importation of Cavalry Horses.—On the 12th inst. the S. S. "Virginian" arrived with 502 cavalry horses for the detachment of cavalry which has been ordered to this Territory.

Arrangements had been made with the Depot Quartermaster for the inspection of these animals upon arrival and as they were led in single file off the boat each animal was briefly examined. The entire consignment was accompanied by mallein test records, the animals having been tested by the army veterinarian at Fort Wingate, New Mexico, just previous to shipment. All of the certificates had been examined by the Federal Inspector in San Francisco, who detained 18 head, the certificates of which were not satisfactory to him. Besides this he detained 65 head, which were suffering from influenza.

The examination after arrival disclosed a number (14 head) suffering from catarrhal discharge of the nose. All of these will be quarantined at the Quartermaster's corrals in Iwilei until they have fully recovered. None of them showed any suspicious symptoms and the entire consignment, with the exception of the 14 animals mentioned, will be allowed to proceed to the cavalry camp at Leilehua as soon as it is desired to remove them. The shipment was accompanied by one of the regular Army veterinarians, who has had charge of these animals for a long period and who assured me that no glanders had occurred among them for a long period. The Quartermaster Captain further assured me that the animals will be kept from contact with any other animals for the period of two weeks.

It should be added that the entire consignment arrived by train in San Francisco on the morning of January 5th and were taken direct from the train to the steamer, where they were placed on board without having entered any corrals or yards in San Francisco. The steamer left San Francisco at 5 o'clock the same afternoon, and I am, therefore, of the opinion that the animals could not possibly have been exposed to any infection while passing through California.

The local Quartermaster Veterinarian, Dr. Monsarrat, will have charge of the 14 isolated animals and will report on their condition from time to time.

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Very respectfully,

VICTOR A. NÖRGAARD,
Territorial Veterinarian.

Division of Entomology.

ENTOMOLOGIST'S REPORT FOR NOVEMBER AND DECEMBER.

Honolulu, December 31, 1908.

*Honorable Board of Commissioners of
Agriculture and Forestry of the
Territory of Hawaii.*

Gentlemen: Following is my report of the work done by the Division of Entomology during the two months, November and December:

INSPECTION.

We boarded 55 vessels and found matter subject to our inspection on 34 of them. The result is shown briefly in the following

TABLE OF INSPECTION.

November.

Disposal with Principal Causes	Lots	Parcels
Passed as free from pests.....	569	13,150
Fumigated for scale bugs and white fly before re- leasing*	13	24
Ordered potatoes returned on account of scab.....	2	298
Ordered apples and pears returned on account of greedy scale	3	532
Burned on account of scale and rot.....	2	2
Burned turnips and horse radish roots on account of cabbage maggot	2	4
On fruit trees because prohibited by on eggs		17
Garbage from the first and		10
	605	4,037

A major portion from Ho-
regon spread of possible

December.

Disposal with Principal Causes.	Lots	Parcels
Passed as free from pests.....	759	16,439
Fumigated for large variety of mealy and scale bugs, white fly and evidence of borer.....	15	41
Mangroves from Manila picked over one by one for a variety of most dangerous pests, then fumigated before releasing.....	1	3
Bamboo plants from Japan treated likewise.....	1	1
Seed potatoes treated with formalin to kill scab....	1	35
Potatoes ordered returned on account of scab and soil	7	813
Apples ordered returned on account of greedy scale	2	115
Burned for a variety of pests.....	7	13
Total examined	793	17,460

PERPLEXING SHIPMENTS.

Scabby Potatoes.—In accordance with your circular letter to potato importers dated April 3, 1908, that the inspector is to report to you the condition of potatoes should they seem untoward to him, I beg to present the following:

The potatoes imported and sent here on consignment are still far from scab-free, although on the whole they are infinitely better than when the present campaign was begun. Repeated actual count proved that in the majority of shipments at least about ten per cent. of tubers in each sack is more or less infested with scab, and that some of these tubers are dreadfully scabby. Recently such a condition was observed in a lot of army potatoes, although I understand army, like navy department bids specifically call for a scab-free article. The presence of badly affected tubers in sacks or crates of otherwise sound potatoes and the regularity of the proportion involuntarily lead one to the suspicion that this means is employed to dispose of an otherwise unmarketable article. Surely no conscientious effort to eliminate scabby potatoes could have been made with so poor a showing of result.

Our present potato growing interests are inconsiderable, but potentially extensive potato growing here is not an impossibility and under some circumstances may become a necessity, and our inspection law intends to protect the future as well as the present grower. Some of our potato growing localities are probably already infested with scab, but it is neither fair nor safe to assume such to be the case with all. Under the present labor domiciling policy of plantations, and efforts of Territorial and Federal governments to encourage vegetable gardening it is fair to assume that any potato brought in may be used for seed purposes, i.e. a source of infection of soil for years to come. In fa

it has repeatedly come to my notice that people contemplating potato planting ordered inferior, because cheaper (*sic!*) grades of potatoes for seed purposes. People with such tendencies, and only the enlightened few are the exception, will use the potatoes left over as unfit for house consumption, and such are badly scabbed potatoes, for seed purposes. This is tantamount to saying that **EVERY SCABBY POTATO IMPORTED MUST BE CONSIDERED AS A SEED POTATO.**

After discussing the problem with Mr. Lewton-Brain some-time ago and Dr. Wilcox recently the conclusion was reached that potatoes we admit should be either *absolutely scab-free* or *not over ten per cent. so infested and treated with formalin according to standard formula.*

Desirable as it doubtless would be the formalin treatment was later found impracticable for the following reasons: First, it is impossible without much biological work to be sure the scab organism is dead, hence growers or shippers cannot be depended upon to make the treatment; second, dipping in formalin here could not be undertaken because of lack of facilities for drying; third, either dry or wet treatment takes more time than we can afford to devote; fourth, the importers in conference with me said they cannot consider the expense of the work.

To get at the practical side of the question I attended a conference arranged by one of the potato importers. The arguments there presented in favor of the present status of potatoes were the following:

(a) The indifference of the Californians to our potato market.

(b) The impossibility to procure absolutely scab-free River potatoes.

(c) The expensiveness of Salina potatoes, which are thus far found always scab-free.

(d) A reason they did not present or press is that there is more profit in the cheaper potato.

To these arguments I would offer in reply that: (a) It is scarcely credible merchants should remain indifferent to a 50,000-60,000 per annum potato market. (b) I am not prepared to say aught about the grades of River potatoes; but (c) It can be proven by actual figures that at prevailing prices Salina potatoes in the last analysis are no more expensive to the consumer than are Rivers. (d) I believe the gentlemen will cheerfully forego the larger profits if the good of the Territory is involved.

Now as to the comparative cost of potatoes, it can be easily shown that the consumer is not the loser even if the initial cost is somewhat higher. For stew purposes he will find ample material among the best of them.

1 crate of 125 lbs. Salinas potatoes in Honolulu..	\$2.50
Less value of crate.....	.30
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Net cost 125 lbs. Salinas potatoes.....	\$2.20
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Net cost 100 lbs. Salinas potatoes.....	\$1.76
Net cost 100 lbs. River potatoes.....	1.50
	<hr/>
Difference in cost to consumer in favor of	
Rivers	\$.26 or 17%
Lesser water content in Salinas, gain of at least..	10%
Lesser waste in preparation of Salinas for the pot	
owing to freedom from scab or other defects	
gain easily	15%
Total advantage from use of Salinas or Salinas-	
type potatoes	25%

And thus the consumer may actually find himself the gainer at the end of the game, in addition to providing against invasion by scab or other pest.

I would respectfully recommend therefore that the importers be given a month's warning from date of mailing of circular and then rule out all potatoes showing evidence of scab. Meantime we will pursue the policy followed hitherto.

Oriental Mase.—Encouraged by the recent U. S. Treasury Department ruling, we have taken upon ourselves to substitute a policy of more thorough study of vegetable matter of Oriental origin for the piece-meal-inspection hitherto pursued. Our findings by way of insect and fungus pests were a startling revelation and we are determined to prosecute our task with vigor. For the small amount of material we need to inspect the tax upon our time is out of proportion, but there is at present no alternative. Because of a train of circumstances referred to in my letter to your president, and especially Uncle Sam's inflexible rules, at least one of us must remain on the dock from the day the Oriental cargo is discharged until practically the last of it has passed entirely out of customs' jurisdiction, generally ten days to two weeks and from 7 a. m. to 5 p. m. of each of those days. Exasperating to time and patience though the task is I am convinced the protection thus afforded justifies it. Few of the pests prevailing in the Orient are known and their potential power for destruction can only be judged from past experience. Our melon fly, which must have come from there, and the San Jose or Chinese scale in the States are examples of that awful power. I hope the Board will deem it expedient and endorse my recommendation in the president's letter.

Greedy Scale.—Owing to rather heavy infestation with this scale bug we were compelled to order returned two car-load

of apples in succession. To the complaint of the growers that my action inflicted heavy loss upon them I replied setting forth my position as inspector of this Board. Following is copy of their reply. Being one of the few positive results of inspection work, it is gratifying:

Watsonville, Cal., Dec. 3, 1908.

Mr. Jacob Kotinsky,
Honolulu, T. H.

Dear Sir: Your letter of 18th ult. to hand, and contents carefully noted. In reply we wish to thank you for your prompt reply and for your views in the matter of shipping fruit into your Territory. We understand that you are doing your full duty when attending to this business for your Territory, and we cannot blame you for enforcing the laws of your people. We believe that you are doing only what is your duty in the matter of inspecting fruit which is shipped to your city.

We will be very careful in selecting our fruit when we are shipping again to Honolulu and see that there is nothing shipped but first class fruit which is free from all insects and disease.

Thanking you for your kind reply to our letter, we beg to remain,

Yours very truly,
(S) M. N. LETTUNICH & CO.

Turnip Maggots.—Owing to repeated condemnation of all turnips imported because of these maggots, importations of this vegetable ceased. The field is now clear for some one here to undertake turnip growing.

The maggot was repeatedly suspected to feed on horse radish and in November a lot was found so infested. The infested roots were cut off and destroyed and the balance turned over to the importer.

Badly Infested Plant from Florida.—I beg to exhibit a plant of *Elcans simoni* infested with a species of *Lepidosaphes* (Purple scale group) from Florida intercepted in course of inspection of mail matter.

Mangrove Shoots from Manila.—The "Buford" brought three boxes of these plants from Manila for the U. S. Experiment Station. Evidently little or no precaution was taken at the place of collection to eliminate possible pests. As they were overcarried the additional weeks gave many of the pests time to reach maturity so that when they were opened they were found teeming with a great variety of insect pests. Fortunately our new dock laboratory was completed and with abundant light perfect quarantine was also secured. With the kind assistance of Mr. Van Dine we spent nearly a day in the stuffy room, picked the shoots over one by one, each of us examin-

ing each of the plants, rejected every one that bore the least bit of a suspicious sign, passing in one instance but a handful out of half a soap box full, and finally fumigated those that passed muster. Under our instructions these were later dipped in Bordeaux mixture before planting. Two species of bark beetles (Xyleboridae) were most numerous as was a moth borer. One species of snout beetle (Curculionidae) bore a sullen appearance, a species of mealy bug and one of a *Chionaspis* closed the list. Satisfied that absolutely no pest passed our vigilance we were gratified with the advantages of inspection. I was practically happy to have the dock laboratory in commission so handily thus saving the necessity of carting the material through town.

MISCELLANEOUS.

Dock Laboratory and Quarantine Room.—The laboratory on the Oceanic dock was completed early in December and is a credit to the service, which it aids in a decidedly substantial way. We had repeated occasion to use it to advantage and with success. We also have there now a sign proclaiming to the world the mission of those structures on the dock.

Fumigatory Exhaust.—Hitherto, in order to ventilate the fumigatories the doors were opened and the gases discharged directly onto the dock. This was dangerous to the operators (Mr. Craw once nearly succumbed) and other people also when operated on steamer days. An appeal was made to the Superintendent of Public Works and he kindly had a 4-inch gate valve and necessary piping put in, enabling us to exhaust the noxious fumes outside and above the dock. This was installed on the Oceanic dock. Mr. Campbell also promised us one for the Hackfeld dock, but, as I understand, the Hackfeld Company is soon to occupy a new wharf the installation of the valve perhaps better be delayed.

Horse.—The horse placed at our disposal by the Public Works Department at the time Mr. Craw took sick we were obliged to relinquish to that Department on requisition. The Territorial Veterinarian was authorized by your president to negotiate for the purchase of an animal for the use of the Division.

Routine.—The routine work of the Division was carried on as usually with the aid of Miss Dayton, the clerk of the Division, and occasional moments snatched from inspection work. Were it not for the faithful service of the assistant and the long hours both of us work it is doubtful whether we could attend to all the work. We earnestly hope relief is coming soon in shape of a competent assistant inspector and entomologist.

Respectfully submitted,

JACOB KOTINSKY,
Superintendent of Entomology

ADDRESS BY HON. F. H. NEWELL,

*Director, U. S. Reclamation Service,
Before the Territorial Conservation Commission of Hawaii,
October 20th, 1908.*

The problem of conservation is not merely Territorial but is of national importance. The Hawaiian Islands being a territory of the United States, the citizens of the whole country should be brought to a better appreciation of their possibilities for development, and should give a substantial backing to your efforts.

SOIL CONSERVATION.

After a six-week trip around the islands the thing that most impresses me is the need of conservation of the soil. I am very greatly impressed with the rate at which the land in some places is being washed or blown away. Forest and water supplies can be renewed by various methods, but the soil supply cannot. Kahoolawe illustrates this in the extreme degree. There the soil has been literally carried away to sea—soil that might have been kept as a valuable asset. At present there is practically nothing over a large part of the island but bare rock and no possibility of getting anything there. This, of course, is an extreme case, but it shows what is liable to happen elsewhere.

The first thing to do in conservation work is to arouse public sentiment along the line that it is the duty of the state to protect its soil. Possibly it may be found wise and practicable to enact regulations to the effect that a man will not be permitted to handle his land in such a way that he will destroy his soil. Here in Hawaii you have examples of the most extreme condition where neglect has caused soil to actually disappear and to be lost forever.

WATER CONSERVATION.

Water conservation has been begun in Kohala and Hamakua and other places and excellent work done, showing what can be accomplished on a large scale. Apparently much more can be done. There is a considerable area of public land which has been reclaimed in a manner similar to what has been done in the Hawaiian Islands. Here, after reclaiming the land, the Government divides it into portions or farm units of 10, 20 or 30 acres and distributes it to the men who will be able to support of themselves. This is the policy of the Federal reclamation service in the Hawaiian Islands, but I have hopes that the Congress, beginning to recognize the importance of conservation by Congress is beginning to take the same policy of the experi-

LAND SETTLEMENT.

It is necessary of course to provide homes for the native population; give them the preference, as has been done on the Mainland with the North American Indians—preference to the extent of land enough for the support of a native family, two or three acres of good land,—and then distribute the rest to desirable American citizens.

It should be possible to secure for Hawaii men such as have built up Southern California; men of moderate means, men who have earned say ten thousand dollars in small business enterprises in the East, and who have come out to California to raise something, not to sit idly. These men have built up the southern end of that State to a remarkable extent. This class of men is still coming West and some will unquestionably come to these islands. I look forward to that small but steady stream of immigration turning this way and in view of it I hope the Territory will preserve the public lands, irrigate them as far as it can, and at the same time ascertain from owners what private lands may be made available for settlement in the same way. Hawaii has much to attract such a class of settlers—once here they would be a potent faction in the development of the Territory.

TRANSPORTATION QUESTION.

The question of transportation is closely joined to that of settlement. Home building and road building, wagon roads, railroads, steamship lines, all must improve together. This class of desirable citizens must have transportation facilities adequate to develop small industries such as are dependent on favorable transportation rates. At present it is said that vegetable and dairy products can be shipped to Honolulu from California in good shape at rates that are less than those for which island products can be shipped to Honolulu from the other islands. If true, will it not be possible to better this condition?

The financial prosperity of the islands at present largely rests on a peculiar basis, that is on the duty on sugar. This is not a very firm foundation and the islands should have something in the shape of other products so that if the tariff is disturbed, things would not all go to smash at one time!

There is no part of the country that impresses me more with the necessity of conservation than Hawaii, nor any part where conservation should result in more immediate benefit. It is a great problem and the quicker we begin work the better.

SPECIALIZATION NEEDED.

I have watched how some men have built up certain specialized industries, for example, a superior variety of apples. By cultivating, studying the packing and shipping of this apple they have brought millions of dollars into a State. Or for another

example take Grand Junction, Colorado, where superior peaches have been developed. The pioneer growers had the usual struggle to get a market, but they have developed a business that brings something like \$4,000,000 per annum into that mountain valley. Here in Hawaii with steamship lines running to important points of trade, it seems that you are very closely connected with good markets. Steamship transportation is better than the average freight haul in the interior!

If you can get a pineapple or a banana or some other fruit that is superior to those on the Mainland, you should have no trouble getting a market. It is my hope that we may find reclaimable areas above the sugar lands that are suited for growing such crops.

STUDY MARKET REQUIREMENTS.

Of course, the first men on the ground are the ones who suffer most from obstacles and who have the most discouragements. They must experiment and work hard, and until they find the particular thing adapted to the climate they certainly have a discouraging time. In Southern California, all the growers belong to associations. This insures a certain uniformity of packing and shipment, such that after the fruit has started on its journey it can be delivered to the best market, wherever that market happens to be. These associations have been formed and work out their own problems much as your Planters' Association is doing. The relations of the railroads in connection with these associations are interesting. The Santa Fe for example has always reached out and given new industries every possible assistance. Some other railroads have an Industrial Commissioner who works with the Fruit Growers' Associations, instructs them about shipping and packing and helps to build up the territory along the line by getting men, telling them why the fruit did not come through in good shape and helping them to keep the cost down. Whatever can be done to bring the fruit trade of the islands into close touch with the industrial commissioners of the mainland railroads is encouraged. I am sure that it would be a

... farmer seems to know nothing
... failure. The man that receives
... great many things to his advan-
... potatoes, the average farmer tries
... market man says no we want them
... hands

... is the
... support on
... live away from the
... his family and

then sell anything that is in excess. There are many such and it should be possible to bring a few of these people this way. Many inquiries come to my office from such men who are looking for a good location. Most of them are poorer, but many say they have ten thousand dollars or so, that they are tired of a cold climate and long winters, and are anxious to locate in a desirable place where they can raise fruit. In helping to place such people my office has practically become a Bureau of Settlement Inquiry. Now I would like, if possible, to enlarge and strengthen that Bureau of Settlement Inquiry by including the Hawaiian Islands—telling men what they can and cannot do and pointing out to them the advantages and disadvantages of living here. If we could get a few of these men here every month it would be of great advantage to the Territory, for they are men that would appreciate this country. Each one that came in that way would, in time, be likely to bring as well some of his relatives or neighbors.

Between the sugar lands and the forest there are places which will be available for use when the leases run out in the next few years. These lands could be irrigated in part at least, and subdivided into small tracts for homesteads. With the expenditure of from one million to five million dollars water could be brought out from the mountains and certain lands developed for the men who would make a home on them and start in the diversified industries.

HAWAII'S SUPERIOR OPPORTUNITIES.

Viewing it from the standpoint of the West, the opportunities here are superior to many that have been taken up in the West; in the Western States we are spending twenty to sixty dollars an acre in reclaiming the land, disposing of it as homesteads. It is on this land that men are supporting families by raising beef, vegetable products, etc., and are building up the State.

In the Kohala mountains large investments in developing water have already been made by private means. But there is still much water going to waste. If this were collected, together with the flood water in the small streams that now go to waste above Kawaihae, it might be used to irrigate the land of Waimea. Comparing it with problems in the States the opportunity looks good. Of course, all these things require careful investigation, and results can only be had after study on the ground.

Already some work of this kind has been done by the Bishop Estate. Water investigations cost a great deal of money, but it is a good investment and one which the Government should undertake. The first thing to be done is for the Territory to make these investigations, and if the Federal Government can help so much the better. The amount of water that goes to waste far exceeds the amount that is utilized. The first problem is to pick up the water on the highlands and to keep it at high elevations and then to use the power developed by dropping it to

water further down the stream and return it to the land to be irrigated.

WHAT HAWAII SHOULD DO.

If the Territory could make a small appropriation contingent on the expenditure of a like amount by the Federal Government, results could be obtained much sooner than when everything is left to the Government. The appropriation of even a small amount by the Territory shows the members of Congress and the officials in Washington that the people here appreciate the work enough to put up money of their own.

On the mainland in irrigation works where private land is developed the Reclamation Service enters into an agreement with the private owners to the effect that their land will be reclaimed as part of the whole system on condition that after the water has been brought to the land they will dispose of it in small tracts to actual settlers. A similar scheme could be worked out here to the mutual advantage of the Government and the private owner.

A further point is that an appropriation by the Federal Government would be much more likely to attract the favorable attention of desirable settlers than if the development was simply an island affair. The fact that the Federal Government had undertaken the work or coöperated in it would give the people confidence. Whenever a new reclamation project is undertaken the newspapers are interested and the magazine and other writers come to the Reclamation Service for information and photographs. The Service furnishes them with pictures and information in regard to the project which these men write up. It is good advertising and accomplishes more than would the expenditure of thousands of dollars for paid advertisement.

HAWAII'S ADVANTAGES NEED PUBLICITY.

As a matter of fact we must not forget that the American people have not yet discovered that Hawaii is a Territory. No man comes to the Islands without feeling the most intense pleasure in the Islands and the people. The question is how to get more people to come here. As soon as the people learn of the Islands they are coming here, and are coming to live. But we want men who have money enough to live comfortably for several years while they are getting established here and who will not have to struggle while waiting for returns to come in. There are many of the best kind of citizens going to Canada to take up those wheat lands. They have money to start with, but they are going out of their own country. Many of them would be glad to come back, but they do not know where to go. The problem is to let these men know where and what they can do in another part of the United States, and that the Federal Government is interested in seeing them well established.

In all reclamation work the Government does not give anything; it invests money with the expectation of getting every cent of it back again. But as so much of the work has to be done on a very large scale and in such a way that money cannot be returned until after a long period of time, it is a problem which only the Federal Government can handle. For this reason the Federal Government is the only one that can undertake the reclamation of such lands.

THE ALASKA EXPOSITION.

An unprecedented opportunity is offered the Hawaiian grower at the coming International Fair at Seattle to bring his produce before the people of the mainland. It is encouraging to learn that agriculture and its kindred industries is to be accorded more than half the space in the display, and that the farm, which has been the basic factor in the upbuilding of the West is to receive due recognition of its importance.

This decidedly agricultural feature of the exhibition should be taken advantage of by the Hawaiian producer and we urge upon all interested in the development of our growing industries to make an especial effort for adequate representation in the display of this Territory.

The United States will make a separate exhibit embracing the realm of agriculture in its manifold phases. This, it is said, will be the most comprehensive display ever undertaken by the government and it will therefore be of particular interest to every one connected with farm or field throughout the country.

The Bureau of Animal Industry will display methods of dipping cattle and sheep; methods of handling live cattle for export; dairy practices and experiments in animal breeding.

The Bureau of Plant Industry's exhibit should prove of great interest to the visitor from our islands. Among those features of more apparent importance than others may be mentioned the display of commercial fibres and paper materials; the methods of plant breeding and models showing the best manner of the storage, handling and shipment of fruit.

The Bureau of Entomology, the Forest Service, the Weather Bureau and the Experiment Stations will also be each specially represented.

In addition to the exhibits in the various buildings, which will embrace collections from every agricultural State of the Union, there is projected an extensive outdoor display, including a model farm and model irrigation tract. Upon this latter will be several acres of plants growing under actual farm conditions.

The exhibition will stimulate interest among the people of the States in the great Pacific region and a great part of this may be directed, by a judicious effort, upon the resources, attractions and opportunities of the Hawaiian Islands.

THE HAWAIIAN BEEKEEPERS' ASSOCIATION ANNUAL MEETING.

The annual meeting of the Hawaiian Beekeepers' Association was held in Honolulu on December 9th with a representative attendance. Officers were elected for 1909 as follows: C. Montague Cooke, president; E. C. Smith, vice-president; David T. Fullaway, secretary, and J. O. Young, treasurer. Many matters of interest were discussed, and the reports of the president and secretary, are given below:

REPORT OF THE SECRETARY.

This meeting closes the second year's work of this Association. The period has been a successful one. I will, however, leave the summary of the year's work to our president. I have for your consideration the minutes of the last annual meeting and those of three special meetings held during the year. The special meetings were called with reference to the visit of Dr. Phillips to these islands, the introduction and distribution of plants suitable for bee-pasturage and the inspection and quarantine of honey-bees and honey introduced into the Territory, respectively. We started last year with a membership of 37. During the year we have received for consideration three resignations and with the two applications to be voted on at this meeting we have four new members for this year, giving us a total membership at present of 38, or an increase of 1 over the membership of last year.

The Association is free from all debt and the treasurer's report for this year shows a balance of \$2.60—this aside from the fact that \$9.70 was expended on subscriptions for members to the American Beekeeper and \$25 on the entertainment of Dr. Phillips. There are some dues in arrears which, if paid, would place the Association, so far as the finances are concerned, on a good working basis. Herewith is the report of the treasurer for the year which has been audited and found correct.

I refer briefly to the work of the Association in connection with the Hawaii Agricultural Experiment Station. The Secretary has assumed the duties of propagating at the Station the following plants under the Board of Agriculture: Carpet grass (*Lippia campechianum*), Texas mesquite (*Prosopis juliflora*), Chinese ink berry (*Cestrum*), and a very valuable bee plant in California, especially for sheep. It is a great

extent for lawns in Southern California. Several hundred seedlings of the logwood have been started from seed collected on the grounds of Oahu College. The Texas mesquite was introduced several years ago from Texas by Mr. C. C. Conradt of Pukoo, Molokai. Seed of the California sages (*Artemisia*) were also introduced during the year and have already been widely distributed to interested persons.

Respectfully submitted,

D. L. VAN DINE,
Secretary.

ANNUAL ADDRESS OF THE PRESIDENT OF THE HAWAIIAN
BEEKEEPERS' ASSOCIATION.

By Albert F. Judd.

Gentlemen: I am going to spare you the ordeal of listening to a lengthy written address. I may say, however, that the Association has had a very successful year—which has meant, to be sure, considerable work on the part of the officers, especially on that of our energetic secretary, Mr. Van Dine. Some things have been accomplished, and these I will touch on briefly. As you have already heard, we took up during the first part of the year the question of introducing bee-plants from California. Mr. Van Dine having submitted to us, as a result of his visit to the mainland, a list of available California bee-plants. It is too early, perhaps, to say that any results have been attained from this work. The Association has declared itself in favor of the policy of introducing, or favoring the introduction, of only such plants as have a dual value; that is, plants that are nectar-bearing and at the same time useful also as fodder plants or forest trees. The adoption of this policy has meant deciding against some plants that might have been introduced, as for instance the horehound, which is a very good bee-plant but one also likely to spread over pasture land and cause inconvenience on the ranches. The difficulty of getting wholly desirable plants led us to look around to see what we already had here in the way of bee-plants. Many suggestions were made, and a great many of us believe that we have now in Hawaii a sufficient number of nectar-bearing plants to supply the necessary bee-pasturage for our bees. One criticism made of our honeys is that they do not possess the distinctive flavor that other floral honeys have. Buyers claim that our algaroba honey has no decided aroma. This is so to a degree, but as far as it concerns bee-pasturage, I think that any one who has an apiary can increase the bee-pasturage around it by plant

ing trees or herbs that we already have here, such as eucalyptus species and logwood, some one of which is in flower at all times of the year and all have a decided aroma. If the apiary is near mud flats or on swampy land the mangrove is valuable. Florida mangrove honey commands a very high price, it is said. There are other plants, too, which may be utilized: the logwood of the West Indies (*Haematoxylon campechianum*), which is well established here, or the Chinese ink berry (*Cestrum diurnum*), which grows wild in many places.

We succeeded this year in getting Dr. E. F. Phillips, Apiculturist of the U. S. Bureau of Entomology, to visit the islands. All of you who met him recognized that he was an expert in the business and had an eye not only to the scientific side of apiculture, but also to its commercial bearing. He has written a very careful report, describing conditions as he found them here, which is in the press now and which will in due course of time be received here. I understand that Dr. Phillips' paper will be well illustrated by photographs which he took here on the occasion of his visit. This brief mention of Dr. Phillips' visit is perhaps sufficient since we shall have shortly from himself a detailed report of what he saw in Hawaii.

Another matter which occupied our attention was the question of tariff revision, in the interest of the Hawaiian beekeepers. The Chamber of Commerce asked the Association to appoint a committee to confer with the representatives of other industries of the islands on what Hawaii should do when Congress met to discuss tariff revision. We appointed a committee and I should like to read part of the letter which it sent to the Tariff Revision Committee of the Chamber of Commerce. It is as follows:

"The honey and wax industry in the Hawaiian Islands represents an investment of some \$250,000. The industry is one of the few minor undertakings that is established and on a paying basis. However, the margin of profit is so small that a discontinuance of the present tariff would ruin the local apiaries. The net profit does not average more than one-half cent per pound, while the duty on honey amounts to one and two-thirds cents per pound. The Hawaiian product comes in direct competition with Cuban honey and the foreign honey and pay the duty of one and two-thirds cents per pound and sell at a profit for the Hawaiian producers receive. As is the case with the Hawaiian honey and wax must go to the mainland and has no chance whatever to sell an appreciable quantity of honey. Neither are there any other places that can use it in large quantities. The Hawaiian producers place their honey on the market in competition with the foreign honey and the Hawaiian product does not stand a chance of being sold on the mainland.

in any way, the entire product being shipped in bulk for the ing and confectionery trade.

“The matter of retaining, and if possible increasing, the present tariff of twenty cents per gallon of honey, or one and two-thirds cents per pound, directly interests every beekeeper in the United States, and the National Beekeepers’ Association has passed resolutions to the effect that an aggressive effort should be made in this direction. At the annual meeting held in Detroit in October a separate resolution was also passed recommending further a tariff of ten cents per pound be placed on beeswax.

* * * * *

“The honey industry is one that appeals to a man of simple means. The product is not perishable and can be stored until a sufficient quantity is obtained to enable the producer to take advantage of the lower rates of freight that prevail for large shipments. It is an industry that can be carried on independently on a large scale, where the territory will permit, or one that can be taken up as a side-issue in conjunction with other pursuits where territory is limited. Not more than sixty per cent. of the territory of these islands capable of offering pasturage for bees is occupied by apiaries. The industry is being gradually developed and extended, but as is the case with all minor industries no difficulties have been met and much experimental work has been necessary to determine the best methods of apiculture for semi-tropical conditions prevalent in the islands. The Hawaiian Beekeepers’ Association feels that it is of paramount importance that no reduction in the honey tariff be made. The industry goes one along the line that Congress has repeatedly urged that the authority in Hawaii to undertake and every encouragement should be offered to those engaged in apiculture in Hawaii to bring the industry to a permanent and profitable basis. Any reduction of the honey tariff would ruin the bee-keeping industry in Hawaii.

We have also done something towards obtaining a proper inspection and quarantine of introduced bees. You probably recall that at the last session of the Legislature a statute was enacted giving specific authority to the Board of Agriculture and Forestry to make rules and regulations for the benefit of the beekeepers in regard to the inspection and quarantine of queens and other bees imported into the Territory. Rules and regulations were provided by the Board, and your officers had considerable work to do in revising the drafts. Finally, on September 1 the Governor approved the regulations as adopted by the Board and they have been printed and are available for distribution. As you know, we have no foul brood diseases in these islands and the object of these rules and regulations is to prevent their introduction.

With the benefit of my experience as president of the Association this year, I should like to outline the following course of action for the coming year. The main difficulty confronting

bee-keeper here is in the marketing of his honey. I think we can take a leaf out of the book of experience of the sugar men for help in this regard, and I would respectfully suggest that an attempt be made to have all the producers of honey contract to sell their honey through one firm or through one person, who could then sell on the mainland. With Hawaiian honey competing with itself on the mainland, the commission merchants profit and we lose. There is, besides, no reason why the small home market should not belong to us. As it is now, the small amount of honey consumed here is imported from the mainland by our merchants. This imported honey may come from districts on the Coast infested with the bacillus of foul brood, and though foul brood is not injurious to the human body, if the honey is kept here in containers that are exposed to bees, the infection may be spread in this way to our hives. If we can arrange to sell honey to the local dealers to their advantage we can undersell the California producers and our honeys will be sold in preference to those from the Coast, thus removing a great source of danger. The only other matter to be attended to during the coming year is the question of an appropriation. Mr. Van Dine read to you in the minutes the resolution passed by the Association guaranteeing to the Board of Agriculture certain expenses in connection with the inspection and quarantining of imported bees. The Legislature meets in February and this matter must be attended to. I think that a comparatively small sum of money would take care of any possible expense incident to the quarantine of bees which may be imported into the islands.

I might also mention that the Association has been asked to place an exhibit in the Hawaiian section at the Alaska-Yukon fair to be held at Seattle next year. We have outlined a plan for our representation, which includes a wax-house, to be designed by Mr. E. C. Smith, of the Garden Island Honey Company; a commercial exhibit of honey and wax as they go to the trade, enlarged photographs of bee-keeping scenes in Hawaii, lantern slide lectures and a leaflet for general distribution. The lantern slides are from photographs taken by Dr. Phillips on his visit to the islands. The leaflet is intended to give in a concise way the conditions of the bee-keeping industry in our islands with a view to attracting those who may be interested as buyers as to the quality and quantity of the honey produced here. I think the exhibit will be a success.

REPORT OF THE ADVISORY LAND LAW COMMISSION.

MAJORITY REPORT.

To the Honorable W. F. Frear,

Governor of the Territory of Hawaii.

Sir:—This Commission, appointed July 22, 1908, to report during the second week of November, 1908, primarily on legislation affecting the present land laws of the Territory of Hawaii and incidentally on the question of the administration thereof, respectfully submits the following report:

Owing to the shortness of the time within which to make investigations and the absence from Honolulu, and in some instances from the Territory, of a majority of the members of the Commission, this report should be considered only in the nature of a partial report. The Commission finds it impossible within the limited time given to consider many of the details of the present laws and will accordingly confine its report to some of the most important problems presented, principally those relating to homesteads.

MEETINGS AND INFORMATION.

Immediately upon its appointment, the Commission published notices in all the papers published in the Territory in all languages, requesting suggestions as to any needed legislation or matters of administration, responsive to which notices, sixty-three communications were received. Public hearings upon duly advertised notices were held on the Islands of Oahu, Hawaii, Maui and Kauai. The attendance at these meetings was small. Except in the instances of four or five communications and a like number of persons appearing at the public hearings, very few constructive criticisms or feasible remedies for suggested evils were received. Discussions were almost always predicated on specific local conditions and were not made on a basis upon which laws of general application could be framed.

LAND LAWS CONSISTENT WITH LOCAL CONDITIONS.

The topography of the Hawaiian Islands illustrates that each of the principal islands has a main ridge running practically across its center. The land inclines from the center almost to the water's edge. The surface is cut by a multitude of ravines or gulches. The result is comparatively few level stretches, and the lands lying on the incline are also cut by gulches and ravines. The highest elevation on the several islands is as follows: Hawaii,

13,825 feet; Maui, 10,032 feet; Kauai, 5,250 feet; Molokai, 4,958 feet, and Oahu, 4,030 feet. The large grants or divisions of land as a rule stretch from the mountains to or toward the sea with their length out of all proportion to their breadth. The government lands do not lie in one body but are separated by private holdings. The soil is of volcanic origin and varied in character. The total area of government lands is approximately 1,676,705.07 acres, a large area of which consists of lava fields and rocks unsuitable for agricultural purposes or even pastoral purposes. While certain comparatively large areas may be classified as pasture lands, the area of first-class agricultural land is small in comparison.

Primarily the situation of the land demonstrates, *first*, that the land laws of the United States founded on the Jeffersonian system of survey, are inapplicable; *second*, that the varied character of the land and the different climatic conditions affecting different localities, require an elastic system of laws, as no strict and precise rule can be laid down which will be applicable to all; and, *third*, that the area of good first-class land is comparatively small, and therefore, in offering land for homestead purposes, the quantity for each individual should not be large, determined by its character, productivity and situs.

HOMESTEADS.

In order that the public domain may be peopled with persons who desire to become actual settlers on the land, the Commission believes that the law should be so framed and administered as to provide liberal terms and give sympathetic treatment to the bona fide settler and at the same time protect the government by proper limitations from abuses against governmental liberality. In other words, the laws should test and enforce the bona fides of the settler. Too much stress cannot be laid upon the point that once the government is satisfied as to bona fide intent of a settler, a sympathetic and liberal administration of the law should be accorded him. Every assistance should be rendered to enable him to fulfill the conditions of his agreement and no stumbling blocks or technicalities or forced constructions should be indulged in which would prevent him from accomplishing this result, the Commission believes.

The Commission also recommends liberal terms of payment, in cash or otherwise, and that the settler should be allowed to properly cultivate the land and that title should be withheld until the settler has complied with the requirements of the law and the bona fides of the settler are established.

The Commission also recommends that the law should be adapted for the benefit of the Cash Free-Settlemen Association.

999 YEAR LEASE.

This provision of the law is essentially adaptable for the occupation of land by Hawaiians, providing them with homes. It serves an excellent purpose and the Commission suggests no amendment at this time. As the limitation of the area provided for by the law is small, and as the practice has been to keep well within the limitation, we believe that the conditions as to cultivation and the time within which occupation should begin should be liberal so that there may be no failure in the requirements named.

CASH FREEHOLD AND RIGHT OF PURCHASE LEASE.

Large initial payments or heavy burdens as to other payments, lax provisions as to cultivation, and early attainment of patent without sufficient length of residence upon the land render these two methods in too many instances unsuitable for the disposition of public lands for bona fide homestead purposes. The provisions under the Right of Purchase Lease, (Sec. 322, R. L. H.) and Cash Freehold (Sec. 326, R. L. H.), whereby at the end of the third year upon only a two years' residence title can be obtained, have led to many abuses and much speculation and without resulting in the making of a home upon the land. The obtaining of title within such a short period by payment of the purchase price is much like the commutation provision under the United States Land Laws which provision has been so severely condemned in the Second Partial Report of the Public Lands Commission appointed October 22, 1903. The Commission therefore recommends that the method of sale under Right of Purchase Lease and Cash Freehold be utilized to only a very limited extent and then only under conditions where its provisions cannot be abused. Yet the Commission does not favor the repeal of these two methods as there may be instances when they may be properly availed of.

SETTLEMENT ASSOCIATION.

This method is a modification of the Right of Purchase Lease and Cash Freehold. The Commission recommends the repeal of the provisions relative to Settlement Associations in consequence of abuses which have resulted from the disposition of land under this method. The cases of abuse have been so apparent, the evils so pronounced and the desirability of a change so necessary, that the Commission has deemed it advisable that the method be dispensed with. Any possible benefits, however, which might have resulted from such a method can be provided for by other methods without the risk of abuses attendant upon the Settlement Association method. In one instance only of which the Commission is advised, that of the Wahiawa Settlement, have these provisions resulted in a proper settlement of the land.

ADMINISTRATION AND NEW LEGISLATION.

The Commission deems it inadvisable to reframe entirely the present land act, yet certain main principles should be added, while certain sections should be amended, and certain other sections redrafted as to details. As a whole with certain amendments the Commission believes that the present land laws with proper and judicious administration are reasonably adequate to meet the needs of our local conditions. No system of land laws can be practically framed which will provide in exact language the terms and conditions to be followed in each individual instance. With conditions such as exist in this Territory requiring an elastic system of laws, the successful application thereof will depend very largely upon the sane, sympathetic, conservative, yet liberal and reasonable administration of such laws. The Commission believes that with the exception of a few amendments, the great land law problems of this Territory are ones of administration rather than of much needed legislation. Provided there had been opportunity for further conference and study, other recommendations might have been made as to certain details. The following recommendations only as to legislation are made at this time :

HOMESTEAD AGREEMENT.

The law as it stands at present may be said to render effective most of the provisions of the method for disposing of land for Homestead purposes, which the Commission recommends, yet not all of them. The method recommended is that of a Homestead Agreement. This agreement involves the following principles, and amendments should be made to carry them into effect. These amendments should form a separate subdivision and be added to the act.

(1) *Method of Sale.*

Sale by lot should be permitted in case of more than one application. This method places all on an equal plane; and the man of small means stands an equal chance with any other. It is the method recently adopted in disposing of some of the lands in the western part of the mainland of the United States. The sale by auction has its advantages, and should be preserved. The particular method of sale for any tract of land offered may be determined by the Governor. After a drawing to determine the successful applicants has been held or an auction sale has been conducted, the Governor should be empowered to issue rules and regulations as to the manner of disposing of lots not taken by the applicants at the drawings or left unsold at the auction sale without the necessity of holding another drawing or sale.

(2) *Area of Land.*

This question has been much discussed. The acreage of deable land in the Territory being comparatively small, the deability for an increase of population by immigration being considered and the principle of the land law system being that settler is to occupy and farm the land himself, the area offered to each applicant should be small. The Commission believe unwise to lay down any hard and fast rule as to definite area. Such area will depend upon the situation and character of land. The limit of area for each applicant may be best described as such an area as shall represent the acreage which in the opinion of the Governor may be reasonably required for the support of a family upon the lands in question. This latter provision follows the rule laid down by the Reclamation Act passed by the Congress of the United States, and represents the latest thought on the subject.

(3) *Price and Terms.*

The land should be appraised at its market value, and the price at which it should be offered to the applicant shall not exceed 25%, nor be less than 10% of its appraised value, depending upon its character and situation. Within these limitations the price should be determined by the Governor and the Commissioner of Public Lands. The applicant shall be required to pay not more than 5% of the purchase price upon allotment or sale, and the balance in not more than ten annual instalments. No interest shall be charged. Low prices are placed upon the land as other considerations forming a part of the purchase price, such as length of residence, restrictions upon assignment or transfer, development of land by cultivation, and the expiration of a certain period before a patent is issued. The above terms are applicable to land which has not been previously under cultivation. It should be deemed advisable to offer for settlement purposes land which has been previously under cultivation, the same should be appraised, and the price at which the land should be offered, not more than such appraised value, should be determined by the Governor and the Commissioner of Public Lands.

(4) *Cultivation.*

The amount of cultivation should depend upon the character and situation of the land and the uses and purposes for which the same may be utilized, such amount to be determined by the Land Commissioner with the approval of the Governor, but in the case of first class agricultural lands, the amount should not be less than 50% of the arable land.

(5) *Residence and Attainment of Title.*

The title papers should not be given the applicant until the expiration of ten years. During this period there shall be an actual residence on the land of not less than five years. The residence should begin not later than at the expiration of the third year, and the period of continued residence at the settler's home upon the land should not be less than six (6) months at any one time. This provision taken together with the provision for extension of time within which to complete conditions for good and sufficient reasons shown as appearing hereafter should not work a hardship on a bona fide settler. To some this may seem a long period of time, but if the settler is desirous of making the land his home, it seems reasonable that there should be no objection as to this length of time before a patent is received. A certain amount of latitude has been given as to the time within which actual residence on the land shall commence. This has been deemed advisable for the reasons, among others, of the time required for the maturity of crops; the offering of an opportunity to earn money to develop the land and to allow for a period at which the land may be said to be income producing, or at least partially so.

(6) *Restrictions on Assignment or Transfer of Agreement or Interest Therein.*

No sale, assignment, lease or mortgage or other transfer or disposition of the agreement or rights thereunder or the land or any part thereof or interest therein should be made without the written consent of the Commissioner of Public Lands with the approval of the Governor. The question has arisen as to placing other conditions or restrictions to prevent the cultivation of the land by others than the applicant himself. At this time the Commission is not prepared to suggest anything further owing to danger of placing such stringent restrictions upon the use of the land. The settler might not be able to make a bona fide use of the land without obtaining assistance to farm the land in a bona

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(8) *Notice of Forfeiture.*

Before a forfeiture may be declared, the settler should have thirty (30) days' notice of the same and of the cause.

SALES UPON FORFEITURES.

Upon the subject of forfeiture sales there appear sections in other sections of the Land Act particularly referring to Right of Purchase Leases and Cash Freeholds providing for an appraisal and sale of the permanent improvements for the benefit of the settler. Similar to these sections provision should be made that before a forfeiture sale, the value of the permanent improvements and the growing crops, if any, should be appraised separately as one item, and the unimproved value of the land separately appraised as another item. Upon the forfeiture sale which should be held expeditiously after the final determination of any forfeiture, the settler should receive the proceeds from the sale of the permanent improvements and the growing crops, if any. There should be no participation or sharing by the settler in the increase or advance on the original price of the land itself for the reasons hereinafter set forth under the heading "Sharing in Increase Price on Forfeiture Sale."

SETTLEMENT OF CONTROVERSIES RELATIVE TO FULFILLMENT OF CONDITIONS.

All controversies or disputes between the Commissioner of Public Lands and the homesteader as to whether a homesteader has in good faith fulfilled his conditions, should be subject to appeal to the Governor whose decision shall be final, rather than that the controversy should be submitted to the courts. The method of appeal to the Governor is simple, expeditious and devoid of technicalities. The high office of the Governor is an assurance to the purchaser that his rights will be safely guarded and at the same time the rights of the government will also be protected. The United States Land Law provides for an appeal to the Secretary of the Interior. Experience on the mainland under such a practice has shown its usefulness. A suggestion has been made to the Commission that an appeal should lie to the Secretary of the Interior at Washington from the decision of the Territorial authorities. The Commission does not approve of such a suggestion. It would be cumbersome, cause great delay, and be in the nature of an acknowledgment of our inability to solve small local problems.

Multiple Homesteading.

The policy of the land law system being to create homes upon the land, the Commission recommends that no applicant should be permitted to take more than one lot for homestead purposes. After an applicant has once exercised his right, he should not be again allowed to apply. This provision should also extend to those who have applied, have been awarded lots, and have abandoned their agreement without a bona fide effort to fulfill all of its terms. Such a provision tends to prevent speculation and carries out the true doctrine of the homestead law; that the land is taken for a home, and not to enter on and sell, and again enter on and sell. That no hardship may be visited on those who have already taken land, not knowing that such a provision might be thereafter declared to be law, and which knowledge might have influenced them in their choice of land, the Commission deems it advisable that such a provision apply to such applications or titles perfected on such applications as may be made from and after January 1, 1909. Neither wife when husband has applied, nor husband when wife has applied, should be permitted to make application.

Citizens.

Only citizens or those eligible to become citizens should be considered as eligible to make applications for government land. Those eligible for citizenship must, in the case of the Homestead Agreement, have become citizens before the expiration of the term of their agreement and, in all cases, before a patent is issued to them, otherwise the land should be forfeited to the government. Neither aliens nor the wives of aliens should be permitted to apply for, acquire or own or hold by lease or otherwise, any government land or rights under any of the land laws of the Territory relative to government lands. In this connection the Commission recommends that the form of oath set forth in Section 347, R. L. H., be amended so as to include persons applying for land under the Homestead Agreement, and also so as to require declarations that the applicant is applying for the land for himself and that he is not applying for the land his homestead claim, and that the title to the land shall be in no person other than himself.

amended as follows: "The Secretary shall make such rules and regulations as may be necessary for the purpose of carrying out the provisions of this Act, and such rules and regulations shall be in full force and effect from the date of their promulgation." The Secretary of the United States.

Sharing in Increase Price on Forfeiture Sale.

The Commission recommends the repeal of that portion of Section 276, R. L. H., which provides that the purchaser may share in the increase or advance on the original price of the land itself upon a sale on forfeiture of the agreement. Such a provision promotes speculation and offers an inducement in many instances for the settler to abandon the land, allow the same to be sold on forfeiture sale, profit by the increase and almost wholly ignore the conditions of this agreement. With a liberal administration of the law in regard to the assignment of agreements and the extension of time within which to fulfill conditions of agreements, all cases of forfeiture tending to cause hardship to the settler may be avoided.

Classification and Survey.

Many of the causes of complaint against the land laws and of failure of the homesteader to make a success of his venture have arisen through an improper classification of lands. Lands have been opened for settlement for certain purposes which were not suitable for the purposes for which they were opened. The Commission finds that the surveys of lands and classification of the same suitable for settlement purposes, are very incomplete. Such data is deemed of the utmost importance and the Commission accordingly recommends that an appropriation of \$50,000 be made for a complete survey and classification of government lands, more particularly undeveloped land suitable for homestead purposes in such detail that there will be shown the classes and character of the land in small areas. This work will require not only the services of surveyors, but also the services of men competent to classify the land under the several heads provided by the Land Act. In this connection the Commission notes that proper plans, descriptions and surveys should be made prior to the time of application for the land and a proper description and plan attached to the Agreement. Such procedure will avoid delay in the issuance of the patent. It is important that the purchaser be delivered his patent expeditiously after he has fulfilled the conditions of his agreement, thereby avoiding all possibility of suspicion and discouragement among purchasers generally. All the detailed data above provided for, including maps, plans, descriptions and notes as to character of land, shall be furnished the Commissioner of Public Lands who shall carefully index the same in convenient form for display so that the information may be easily obtained by intending purchasers as well as the general public.

Roads.

The importance of good roads is highly necessary and self-evident. The Commission recommends that either a certain percentage (determined by the Commissioner of Public Lands with the approval of the Governor) of the territorial revenues derived from the sale of public lands, whether or not the lands sold are opened for settlement as now provided by Act 99, S. L. 1905, be set aside, or that specific appropriations be passed by each legislature, whichever plan may be deemed the more advisable according to the administration of the finances of the Territory as a special fund, for the specific purpose and no other, of constructing and maintaining homestead roads, that is, roads within the homesteads, or roads leading from the homesteads to the public roads of the Territory. The plan and procedure outlined in Act 99 of S. L. 1905, is approved. However, the Commission believes that in addition to the present legislation there should be funds provided for homestead roads without awaiting for or relying entirely upon the proceeds from the sales of the particular lands opened for settlement through or to which the road is to be constructed. This does not necessarily imply that no land is to be opened for homestead purposes before the road is built as such a provision might lead either first, to the expenditure of large sums of money without adequate benefit to any considerable number of people, or, second, a delay in the opening of lands for settlement. The terms set forth in the present law (Act 99, S. L. 1905) seem to properly provide for the time and manner of constructing such roads.

Government Commission Agent and Miscellaneous Matters.

To encourage the development of diversified crops and particularly the produce grown by the small settler, the Commission recommends that the Government establish a general commission agency in Honolulu solely for the purpose of handling island grown products. A salaried government commission agent should be appointed to conduct exclusively the business outlined. The producer should be charged a small commission to assist in promoting the enterprise. This recommendation may be deemed in the nature of an experiment, but it is thought that it is worthy of a trial.

The Commission also recommends that the Legislature make a specific appropriation to be used in devising ways and means of exterminating as far as possible, or minimizing the effect of injurious pests and other enemies of the products of the settler.

Administration of Developed Cultivated Lands.

The main object in the administration of public lands is to endeavor to open *first* for settlement those lands which are unde-

veloped, thereby adding to the territorial domain as a whole greater productivity and also increasing the resources and revenues of the Territory. Practically speaking, new or more land is created, that is, all land is brought to a higher state of usefulness. It is wiser to ask the settler to help develop the land of the Territory, rather than to place him on land which others have already developed for him. This policy is advocated by Mr. F. H. Newell of the United States Reclamation Service after a personal inspection of every island in the group and a consideration of the administration of any system of land laws relative thereto. While the policy above outlined and shared in by Mr. Newell is the main policy and should be the end sought to be attained, yet it is deemed advisable that in conjunction with that policy to a limited extent, and depending upon their character and situs, lands already highly developed, such as land at present under cultivation for sugar cane, be gradually opened for settlement. The opening for homestead settlement purposes of lands being at the present time under cultivation for sugar cane, should be accomplished by a growth, an evolution, not a revolution. Great care, however, should be exercised in the homesteading of such lands. It cannot be denied that by overwhelming odds the cultivation of sugar cane is the main industry of the Territory. The prosperity of the Islands requires that this industry be continued and not crippled or its present status diminished beyond a certain limited extent by withdrawing from its support the experienced and dependable cultivation of lands at present devoted to that purpose. Consequently lands lying in the center or indispensable to the use of the plantation should not be withdrawn for homestead purposes. While there is still other good agricultural land to be developed which will be more readily available and the particulars of which will be more easily ascertainable after complete surveys, data and descriptions have been made as hereinbefore recommended, the Commission can see no occasion for opening much of this land at the present time, and therefore recommends that gradually and only from time to time should such highly developed lands be opened for settlement.

All leases executed at the present time of government lands suitable for agricultural purposes contain the reservation that the government may withdraw any of the demised land at any time for homesteading purposes. This is an ample protection for the future.

The Commission does not favor the guarantee by the Territory of the bonds of private railroad enterprises thereby involving the responsibility for the payment by the Territory of large amounts of money. This Territory is now obligated to the payment of its own public bonds and may desire to issue more bonds for public as distinguished from quasi public purposes, that is, for those purposes within the limitations imposed by the Organic Act.

Committed to a policy of guaranteeing the bonds of railroad

and other quasi public enterprises, which from the nature of the venture are hazardous and involve large expenditures, might tend to impair the Territorial credit, or at least affect the rate of interest on government loans. The gravity of the situation is emphasized by the fact that the guarantee of private railroad bonds is not within the authorized powers of the Territorial Legislature outlined in the Organic Act. The Congress of the United States has specifically withheld such a power from the Territorial Legislature.

Honolulu, T. H., November 9, 1908.

Respectfully submitted,

A. LEWIS, JR., *Chairman*,
W. B. THOMAS,
S. M. KANAKANUI,
J. P. COOKE.

Members of the Commission:

A. Lewis, Jr., Chairman,
William A. Kinney,
Alfred W. Carter,
Carl S. Smith,
Samuel M. Kanakanui,
William B. Thomas,
Joseph P. Cooke, Secretary.

The use of the word "homestead" is employed to convey the intention of homemaking irrespective of the method by which the possession during the formative period is held; whether by lease with the opportunity of converting the occupancy into a fee simple title, whether by agreement of sale or whether by lease of very small areas particularly for Hawaiians for such a period as to constitute a holding for several generations. The use of the word "homestead" does not imply that the method employed in creating it is the same as that provided by the Homestead Act under United States Land Laws.

REPORT OF A. W. CARTER.

I do not believe that a radical departure of legislation is required regarding homesteading within the Territory, but rather feel that the success or failure of the same will depend upon the question of transportation facilities, the intelligent subdivision of the property available and a sympathetic administration of the law and perhaps, may be added, facilities for disposing of the products raised when reaching market.

TRANSPORTATION.

I do not favor the government, Federal or Territorial, guaranteeing the interest on bonds issued for the purpose of construct-

ing railroads within the Territory. Any railroad constructed within the Territory must depend to a very large extent for its income upon the sugar plantations. There is no justification for the construction of railroads at the present time except as they reach out for the sugar plantations' trade and this will be true until the economic conditions of the country change. Those primarily benefited by the construction will be the owners of the system (if it is profitable), the sugar plantations along the line, and the owners of real estate other than plantations. I am not in a position to state what area of government land a railroad, say through the Hilo, Hamakua and Kohala districts, in the Island of Hawaii, would benefit, but I think I am safe in saying that much over 50% would be private holdings. Again much of the construction would be along the sea-coast in order to reach the plantation mill, the only trade that would make it possible. In other words such a road would cater to highly developed land the most of which is owned and controlled in large holdings by private individuals. The homesteaders would derive advantage, but not to such an extent as would justify the guarantee of bonds by the government. The building of railroads in this Territory would no doubt have progressed very much more rapidly were it not for the conditions existing. This is a small community and a large part of the value of the property of the Territory is controlled by a comparatively small number of individuals. There is but one company operating any regular line of steamers between the islands and water transportation is controlled largely by the same people who control the plantations, and interests are so interwoven that it is difficult to obtain capital or contracts for railroads which would interfere with the other method of transportation. I believe that a railroad through the country above-mentioned will be constructed notwithstanding the fact that it has been checked in the past, and that the same will be of great advantage, but I believe that it is one that should not be encouraged to the extent of the government's guaranteeing bonds issued for construction. The present development of the country itself justifies the establishing of a road. As stated above water transportation between the islands is in the hands of one concern and I believe that rates are in some instances excessive, transportation charges being greater in many cases upon inter-island shipments than they are from the mainland to Honolulu. I also think that great discrimination is made between small shippers and the large shippers. This in itself works against any successful homesteading policy in the Territory. Probably the Federal law now in effect will meet this situation.

In my opinion there should be a large appropriation made, say of \$100,000, for the purpose of constructing roads to and through homesteads, and that all payments on account of homesteads hereafter be set apart and placed to the credit of a special fund to be

available for the construction of such roads. Lots should not be subdivided nor allotted nor sold until such roads are completed.

I believe that large discretion should be left to the executive officers of the Territory. The nature of the land varies greatly in its productiveness, and there is a great difference in the character and habits of those seeking homesteads which should be taken into consideration in fixing the areas. From the lessons of the past we have been taught that safeguard should be taken against speculation and acquiring property for the benefit of third parties who are themselves large land owners. These abuses should be provided against in every way possible, bearing in mind that the terms and conditions should not be so stringent as to prevent persons taking up land for homestead purposes or make the fulfillment of the contract over burdensome to perform. I believe in an extension in the period when patents may issue, requirements of actual residence for longer periods of time than has been customary and, perhaps, requirements that a larger percentage be cultivated to extend over the period of agreement before title is acquired. Added to these, smaller areas but ample for the maintenance and support of a family if properly and intelligently tilled. The purchase price should be low—not more than 25 per cent. of the assessed market value—payments easy, lasting over the period of agreement without interest. These ideas are carried out in practice by what is called the special agreement, which the present Governor of the Territory has been using and the amendments to the law suggested by the majority report I believe to be sound legislation.

One of the obstacles which have confronted the homesteader in the past has been his inability to obtain a fair price for the products raised within the Territory. I believe it would be well for the Territorial Government to seek legislation which would enable it to station an agency in Honolulu for the purpose of assisting the producer in disposing of his produce, charging therefor a reasonable commission for the work involved.

No intelligent person aware of the existing conditions within this Territory would advocate the cutting up of all government land now occupied and planted to sugar cane and turning the same into homesteads. The nature of the industry requires that homesteads be taken up on a large scale, and requires in its nature that any policy should be destructive to existing industries and to an industry of such magnitude as that of sugar cane. I believe in the policy on the part of the United States or the officers of the Territory of giving all land cultivated in sugar cane from the date of the homestead law to the greater part of the best land in the Territory for sugar cultivation, and while I have not any objection to homesteading in connection with the sugar industry, I have brought about this time advances,

other crops may be successfully grown on parts of the land now occupied with sugar cane.

I would urge liberal appropriations in favor of the Federal Experiment Station for the purpose of experimenting in tropical agriculture. Much good work has been done already which will be taken advantage of in the future. Public moneys are well expended in this direction particularly for a Territory situated as we are, peopled by an alien race out of all proportion to those of our own allegiance.

Respectfully submitted,

ALFRED W. CARTER.

Honolulu, November 10, 1908.

REPORT OF C. S. SMITH.

Hilo, October 29th, 1908.

Honorable W. F. Frear,

Governor of the Territory of Hawaii,

Honolulu, Oahu.

Sir:—It was agreed by the Advisory Land Law Commission that meetings should be commenced early in the month of September and continued until the work allotted was completed. For the purpose of undertaking a study of the land laws and attending such meetings I have devoted the month of September and a part of the month of October. Professional engagements compelled my return to Hilo before the final report of the Commission was drafted for your consideration, and since that time I have had no opportunity to discuss the contents of such report with my fellow-members. Indeed, many of the questions raised were left undecided before I was compelled to absent myself from the further deliberations from which I expected so much.

From the discussions which have taken place I know that I differ from some of my colleagues on subjects which seem to me of considerable importance, and have reached the conclusion that such subjects should be brought to your attention, so I find myself obliged to submit a separate report, which will probably contain matters covered by the report submitted by the other members of the Commission. Not having had the advantage of reading the majority I shall be undoubtedly led to a restatement of several matters which need not have encumbered the records of the Commission.

I cannot account for the fact that so few people attended the public meetings of the Commission held on the islands of Hawaii, Maui, Kauai and Oahu otherwise than by concluding that comparatively few people are now interested in an amendment to the land laws. On occasions, the Land Act of 1895, and the administration thereof, have been the subject of caustic criticism. It will be recalled, however, that aside from discussions in political campaigns the public has been most interested in the land laws at the time of a prospective exchange of a large tract. At the present time there are not in this Territory any considerable number of persons who are anxious to enter upon public lands for agricultural purposes and with a bona fide intention of maintaining a living from the products of the land. If any considerable quantity of land is to be settled the homesteaders must be induced to come here from the mainland.

There appeared at our meetings very few mechanics and wage-earners who wished to be heard upon the subject under discussion. From these and from other observations which I have been able to make I am brought irresistably to the conclusion that the problem confronting us is not one of land laws, but is a broader and more serious econocical problem. In settling up the Territory with an independent, self-respecting and persevering class of small land owners we shall be compelled to go beyond the mere amendment of our land laws. The fact that several hundred bona fide home-seekers have attempted to find a living on the public lands of the first land district within the past ten years, and of these over 85% have been failures, is one which must give us pause. The slightest examination of the subject will demonstrate that the conditions confronting the home-maker are responsible for every case of failure, and that the land laws are an unimportant factor. About some of these conditions I shall ask your attention.

The subject which I believe to be of first importance in the matter now in hand is that of transportation. While there exists no adequate means of transportation for the products grown on lands now held by the Government, those lands will continue idle or eventually be absorbed by corporations and large individual owners who can handle transportation questions in a manner far beyond the capacity of the holders of small tracts. The land now available for settlers is situated at a considerable distance from the government roads and still farther from water-ways. No considerable number of railroads have yet been built in this Territory. The cost of transportation of supplies to the new land and of the products from such lands to market is prohibitive. That prohibition will continue until the Government shall have taken steps to relieve it. For the purpose of illustration let me call your attention to a question of cost which will confront a settler upon his taking up land on the island of Hawaii.

If the homesteader selects a desirable piece of land at Ahualoa,

about five miles above the government road at Honokaa, of Hamakua, Island of Hawaii, he must erect a small store for himself and family from lumber purchased in Hilo or Honolulu. Hilo is sixty miles distant by land and Honolulu twice as far by water. The cost of rough pine lumber ranges from \$30.00 to \$35.00 per thousand in the lumber yard. The cost of ice is slightly under that of Honolulu. The cost of transporting lumber from Honolulu is as follows:

by boat from Honolulu to Honokaa landing, per thousand	\$ 6.00
wharf charge paid to owner of private landing, per thousand	3.50
freight to government road, per thousand	5.00
freight from government road to homestead, per thousand	8.00
Total cost of transportation	\$20.50

The cost of transporting the same lumber from Hilo, over-land, is about double the total given above. The cost of lumber delivered upon the homestead is over fifty dollars per thousand.

On all feed stuffs and other supplies, as well as the produce grown upon the land, are correspondingly large.

The particular locality referred to there is a railroad already surveyed, with franchise, surveys, and everything complete and ready for construction. When built such a railroad will completely solve the transportation problem for the district which it serves, giving to the adjoining land owners cheap and rapid communication with the principal harbor town of this island. These roads must be financed on the mainland where a reasonable guarantee for the payment of bonds is required. To meet this situation I recommend:

That steps be at once taken to obtain from the Federal Government a guarantee of the payment of 4% bonds of such sums.

2d. Failing to obtain the guarantee by the Federal Government the Territorial Legislature should be requested to give a guarantee of the Territory under an enabling act passed by Congress.

Policy which I recommend is in accordance with that established by the United States in giving government aid to all of the railroads and is identical with the enactment of Congress giving aid to railroads in the Philippine Islands. (33 Stat. L.

The next problem is that of homestead roads. So long as the settler is compelled to cut private trails through a tropical jungle to transport his supplies and products with pack-animals, just

so long will the settlement of public lands be retarded. To meet this I propose that appropriate legislation be urged whereby a certain proportion of the Territorial revenue received from the sale of public lands be set aside as a special fund for the building and maintenance of homestead roads. Homesteads should not be offered for settlement until roads to them have been provided.

It is the experience of every country producing fruits and farm products that the producer falls an easy prey to unscrupulous commission agents. The banana growers in the first land district have been compelled to abandon an otherwise profitable industry solely because of the dishonesty of commission agents. To guard against this, and for the purpose of creating a greater demand for Hawaiian fruits and other products, I propose that the Territory adopt a plan which has proved of such a vast benefit to the British Colonies. By this plan Territorial agents are stationed at various points for the purpose of inspecting fruits and other products upon arrival at their market to protect the producer. These agents also work to increase the demand for such products. The plan which is suggested has revolutionized the handling of foreign products shipped from New Zealand to London.

With transportation problems and market problems solved the settler is confronted with a financial problem, especially in the early period of his settlement. I know of no place in the Territory where a homesteader who has valuable improvements made upon land which he holds from the government, but to which he has no title, can go for financial aid. The banks seem to be unable to advance him any money, and the terms imposed by private lenders are impossible. To meet this it is recommended that the Territory loan money to bona fide settlers who have with capital and labor improved their holdings to such an extent that the improvements are fair security upon the money advanced. Every precaution should be taken to prevent the Territory from entering into competition with banks and other private financial institutions, but this can be done without difficulty for the Territory will be lending its aid to persons who do not obtain any assistance from private concerns.

The foregoing recommendations concerning transportation, roads, government commission agents, government homesteaders affect all portions of this Territory alike. Special recommendations to meet difficulties which are peculiar to certain districts are also suggested. The most important of these is that in the first land district water has come from the mountains and been and pending litigation has been pending on the line of policy adopted by the Territory in the Reclamation Act but going forward the government should take steps to secure water from time to time for the use of the first land district and water

rights already appropriated, until such time as there shall cease to be any private ownership of water rights in this Territory.

The Federal Government has long followed the policy by which it disposes of government land situated within town limits. There is no reason why this Territory should seek a financial profit by holding town property for increased values. A considerable amount of property is now owned by the Territory within the limits of growing towns. One tract on the main street of Hilo contains three acres and is put to no purpose. Either this land should be devoted to park purposes or sold at auction.

A very considerable amount of complaint has been made to our commission by people who have asked for information concerning government land at the office of the Land Commissioner. The Commissioner and his agents have also pointed out a defect in the administration whereby the government land now available for settlement is without survey and without classification. To meet these two situations I recommend that the next Legislature be requested to furnish a sufficiently large sum to the Survey Department to carefully survey all of the public lands of the Territory, both by boundaries and by classification, and to furnish the Land Commissioner with complete data and maps. While this work of surveying is going forward competent persons should be appointed by the Governor to classify the lands into the several classifications provided by the Land Act.

The general survey and classification which is here proposed will avoid a repetition of needless surveys.

One matter of administration involves a sufficiently large tract of land to warrant its consideration in this report:

Many years ago the government leased to the Waiakea Mill Company a tract of land on the Island of Hawaii of about 95,000 acres in extent, at an annual rental of \$2,000.00. With the growth of the sugar industry a portion of this land has come to be of immense value for cane purposes, and other portions have been rented out by the lessee for town lots. The lease will expire in less than ten years. The lessee has erected costly improvements upon the land which must be kept in repair at a heavy expense. With no guarantee of a continued existence the lessee is in a position where it must obtain all the benefit from the land without making a corresponding return to the soil or any adequate upkeep of the improvements. This is to the great disadvantage of the Territory as well as the lessee. Under the Organic Act the lessee will be entitled to own in fee simple only 1000 acres of land. Under the circumstances which I have detailed I suggest that the government enter into an arrangement, if possible, with the lessee, whereby the lease is mutually cancelled, for a proper consideration, and a fee simple title to at least 1000 acres be granted to the lessee. The balance of the cane land consists of more than 6000 acres and can be opened to settlement under the present law. Several hundred acres of beach property, and land lying within

the town site of Hilo, can be put up at auction and a large revenue received. The greater portion of the tract will undoubtedly be reserved for forest purposes. The situation is one which demands attention in the immediate future, whether viewed from the standpoint of the Territory or that of the lessee.

Respectfully submitted,

CARL S. SMITH.

AN INTERESTING PUBLICATION.

As this number of the Forester contains much information of value to the Apiarist, it may not be out of order to call attention to the very excellent publication, "Gleanings in Bee Culture," which is published weekly by the A. I. Root Company of Medina, Ohio. The paper is an exceedingly readable little publication and contains many valuable articles during the year, interspersed with a great deal of instructive advice to the honey producer. The issue of December 15, which is just received, is a particularly attractive one and contains many good illustrations.

REVISED FARMERS' BULLETIN.

The Angora Goat. By George Fayette Thompson, revised by Edward L. Shaw, Assistant in Animal Husbandry in Charge of Sheep and Goat Investigations, Bureau of Animal Industry. Pp. 48, figs. 8. (Farmers' Bulletin 137.)

BY AUTHORITY.

Notice is hereby given that the districts of the District Foresters and District Fire Wardens for the island of Molokai have been modified so that from this date on Mr. James Munro has the area lying to the West of the land of Mapulehu and Wailau Valley; and Mr. C. C. Smith has the portion at the East end of the island lying to the East of the land of Mapulehu and Wailau Valley.

It is also announced that Mr. B. Penhallow has been appointed District Forester for the District of Molokai and for the District of Maui, resigned.

J. S. HOLLOWAY,

Secretary, Board of Commissioners of Forestry

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NATIONAL CONSERVATION COMMISSION.

After the conclusion of the conference of the Governors at the White House last May, President Roosevelt merged the recently created Inland Waterways Commission into the more comprehensive National Conservation Commission, of which new body together with the three additional divisions of Forests, Minerals and Lands, the division of Inland Waterways forms a component part. Of this important Commission the Honorable Gifford Pinchot was appointed chairman and the colossal task of inventorying the national resources of the country was immediately undertaken. The result of these exhaustive labors is embodied in the report of the Commission which will, in due time, be transmitted by the President to Congress. It is safe to say that never before has such a definite inventory of the natural resources of a nation been compiled, and the explicit and comprehensive character of the data which have been tabulated will rank this report as one of the most valuable which have been compiled in the history of the nation.

The general report of the Commission together with the reports of the four divisions already enumerated were presented before a notable audience to the Joint Conservation conference held in Washington on December 8, 9 and 10 last. From the proceedings of this meeting it is apparent that a definite advance has been made in the history of Conservation, and that the volume of discussion, addresses and printed articles of the last few years, which has been endeavoring to awaken the national conscience, is about to crystallize into action. On all sides it is evident that the merely educational programme of the movement is past and the time is at hand when the whole nation, irrespective of political issues, will take a bond of fate and perpetuate to this great people the heritage with which it has been endowed.

THE CONFERENCE.

The conference was opened by a mass meeting at Belasco theater which was presided over by President-elect William Howard Taft. Occupying the stage with the principal speakers were members of the President's cabinet, members of the National Conservation Commission, and Governors of various States and their associates.

The meeting was called to order by Mr. Pinchot as temporary chairman, who introduced the Rev. Edward Everett Hale, the venerable chaplain of the United States Senate, whose invocation was especially appropriate. Mr. Pinchot than introduced the permanent chairman with a brief speech of explanation in which he said, in part:

"The essence of conservation is the application of common sense to the common problems for the common good.

"Conservation is simply obvious and right. Therefore of all the great movements of our recent history, not one has gained so rapidly in public appreciation and support, and not one has promised such results in securing the greatest good to the greatest number for the longest time. . . . The history of a nation is written in great movements, great occasions and great men. We are gathered here today in the furtherance of a great movement, on a great occasion and in the presence of great men."

Judge Taft then presented the first speaker of the meeting, President Roosevelt whose address was enthusiastically received. His declaration in favor of a bond issue for internal improvements, if no other recourse offered, apparently met with the fullest and most hearty approval of his audience.

ADDRESS OF PRESIDENT ROOSEVELT.

Governors, Representatives of the States, and of the great national organization, members of the National Conservation Commission, and you men and women, my fellow-citizens, I welcome you here, our guests, to Washington and to the work you have gathered to do. No service to the nation in time of peace could be of greater worth than the work which has brought you together.

In its essence your task is to make the nation's future as great as its present. That is what the conservation of our resources means. This movement means that we shall not become great in the present at the expense of the future, but we shall provide that we may show ourselves truly great in the present by providing for the greatness of our children's children who are to inherit the land after us.

It is the greatest national task of today, and I thank you for making ready to undertake it.

A NATIONAL INVENTORY.

If you do no more than fix attention upon the problem, you will have done well. It augurs well for the future that you are here, and it is to the credit of our country that in this matter it should take the lead among the nations of the world. All we are asking, gentlemen, is that the national government shall proceed as a private business man would, as a matter of course, proceed. He will regularly take account of stock, so that he may know just where he stands. If you find that he does not, that he does not know how his outgo corresponds with his income, you will be afraid to trade with him. The same measures of prudence demanded from him as an individual, are demanded from us as a nation. Unfortunately, nations have been slow to profit by the example of every individual among them who makes a success of his business. The United States is substantially the first nation to prepare to take an inventory of its stock in hand, and it has only begun to do so, in any definite way, within the last few months. Last May, you, the Governors of the States and Territories, met at the White House to confer with each other and the President, upon the material basis of our national welfare. You united in a memorable declaration, which should hang on the wall of every school, and every citizen who is a voter in the United States in the next generation should know about it. Out of the conference at which the declaration was adopted grew the National Conservation Commission, whose chief duty was, as I have said, to prepare an inventory of the national resources of our country, those resources which are, in the language of the Governors, the foundation of our prosperity. This report is to be used by the President in transmitting to Congress information as to the State of the Union so far as the natural resources are concerned.

THE COMMISSION.

The Commission consists of Senators and Representatives, members of the executive departments, and public spirited private citizens familiar with particular resources. It is wholly without funds, and it has, therefore depended altogether on the public spirit of its members and the cooperation of the executive departments at Washington and in the several States, especially the scientific and statistical bureaus.

I wish to take this opportunity to express on behalf of the people of this country my profound appreciation of the disinterested work—work so valuable that it could not be paid for adequately and which, as a matter of fact, was not paid for at all—performed by the members in private who have given so lavishly of their best time and thought in forwarding this cause. Its work has brought these bureaus in closer and more effective cooperation than ever before, and for this matter its

results will rank as by far the most useful statement of natural resources ever prepared in any country. Each bureau, without relaxing its regular work, has collected and summarized the results of its past work, and has contributed them to the Commission.

I desire to make special acknowledgment to the men who have so cheerfully and successfully accepted and carried out this additional task. They have rendered a real service to the whole nation at a cost of great personal sacrifice of time and effort to themselves. And the best of it all was the admirable spirit of cooperation which characterized the whole work. I am especially glad to welcome the cooperation of the States, through their conservation commissions and otherwise. Without it the great task of perpetuating the national welfare would succeed with difficulty. If States and nation work for it together, all in their several fields, and all joining heartily where the field is common, we are certain of successive advance.

EFFECT OF NATIONAL IMPROVIDENCE.

No right-minded citizen would stop the proper use of our resources; but every good American must realize that national improvidence follows the same course and leads to the same end as personal improvidence, and that needless waste must stop. The time to deride or neglect the statements of experts and teaching of the facts, has gone by. The time to act on what we know has arrived. Common prudence, common sense, and common business principles are applicable to national affairs, just as they are to private affairs, and the time has come to use them in dealing with the foundations of our prosperity.

Now I do not believe in hysteria or sensationalism in the press or anywhere else. I would not grow hysterical or sensational in describing our condition, but neither must we allow a false security based on conditions long since passed away to blind us or prevent us from seeing facts and applying common sense to the situation they disclose. The purpose of the inventory was to give the facts—not to create an alarm—but to take stock of what we have, and so to lead to the necessary action for its preservation and increase.

INTER-RELATION OF OUR RESOURCES.

Our natural resources are so related that the use of one affects the use of all others. This is especially true of our waterways. Every man, woman and child within our borders has an interest in them, through navigation, power, irrigation or water supply—or through all four. We have neglected our waterways more than any other natural resources, and we must put an end to that neglect. The Inland Waterways Commission has told us how.

First, let us prepare a comprehensive plan for inland waterways development along the lines pointed out by the Commission. Such a plan must consider every use of the water; it must put the interest of all the people in advance of any private interests whatsoever.

A NATIONAL PLAN NEEDED.

Now, gentlemen, remember that the way to make the waterway improvement what it must be made, is at hand, and let us refuse to pay heed to anything but the great common interest. If you dissipate improvements throughout the country on the ground that each Congressional district shall have its share, you would better abandon the project from the beginning. I want to you to have a comprehensive plan formulated by a National Commission, because I want to see that plan genuinely national in scope, conceived in a spirit that will make it genuinely for the use of the whole Union. That plan must consider every use of the waters and the preparation of that plan should begin at once. We need the plan. We need to have a comprehensive plan, but that does not mean that we should not begin the work now. Begin the plan, but there are certain features of the work which we already know will fit into any right plan that is produced; for these pieces of work, plans have already been approved. Our precious policy of procrastination, delay and fitful and partial accomplishment has borne its fruit. Our waterways are deserted, and in return for our vast expenditures we have little or no actual navigation to show. The people are ready for change. Let us have it, and let us have it—at once. If we can pay the cost from current revenues, let us do so. If not, let us issue bonds. I always favored paying out of the current revenue anything we can possibly pay. I would not on any account go into the business of issuing bonds to pay for anything that was not of a permanent and national good. I hope it will not be necessary here, but this is a great permanent enterprise for a permanent national good, for the permanent national good of our children, and, if it is necessary, then it is all right to issue bonds, so that the enterprise can go ahead. This work should be begun at once. Of course, there must not be the slightest recklessness or waste of money. No work whatever should be undertaken that has not been thoroughly examined and fully approved by competent experts. Above all, not a cent should be expended to satisfy special interests, whether of a business or a locality, or to promote any man's political fortunes. This is too large a matter to be handled in this way. We must approach it from the point of view of the national interest, under the guidance of the wisest experts in engineering, in transportation and in all the uses of our streams.

THREE THINGS NOW NECESSARY.

Forests and waterways cannot be separated in any successful treatment of either. Forest protection and river development must go hand in hand. The three things which should be done without further delay are, therefore: First, to provide for a comprehensive plan of waterway development; second, to begin at once the work already planned, that will surely fit into the larger plan; third, to provide amply for forest protection against fire, against reckless cutting, against wanton or reckless destruction of all kinds, and to secure the Appalachian and White Mountain National forests without delay.

Immediately following the address by the President, Governor Chamberlain, of Oregon, presented a paper dealing more particularly with waters and waterways and the difficulties in the way of establishing an equitable "modus vivendi" between the Nation and the States for their control.

On Wednesday morning, December 8, the conference proper began with the reading of the report of the National Conservation Commission. The full draft of this document will be submitted by the President to Congress, and is at present not available. A condensation, however, of the work of the four sections of the Commission has been prepared and it is intended to give a brief summary of these in a future issue.

RESIGNATION OF MR. W. M. GIFFARD.

The resignation of Mr. Walter M. Giffard from the Board of Commissioners of Agriculture and Forestry has been necessitated by his near departure for a prolonged absence from the islands. For many years past Mr. Giffard has been identified with the agricultural welfare of Hawaii and there are few important developments with which he has not been intimately associated. As a Commissioner of Agriculture and Forestry since the creation of the Board, and its President and executive officer for some years, he has been in a position to direct, and often to control the issues which have been instrumental in bringing about the favorable conditions we of today enjoy. How well he has succeeded is evidenced by the result of his efforts, and by those who have been associated with him. A man upon whose efforts many business interests made demand, he yet found opportunity to devote much time to the general welfare of the Territory. Together with all his past associates, the Forester wishes its Founder and first Editor, a full measure of health and happiness during his absence from Hawaii, and looks forward to his return to the islands which have been so long his home.

ANNUAL EXHIBITION OF POULTRY.

The annual exhibition of the Hawaiian Poultry Association took place in the National Guard Rifle Gallery, Honolulu, on Thursday, January 14, and two succeeding days. The collection of birds was a very satisfactory one and maintained the high standard of quality of former exhibitions. In addition to the poultry display, agricultural exhibitions were made by the Hawaii Experiment station and by the Board of Agriculture and Forestry, although it is to be regretted that it was found impracticable to include the general agricultural competitive display which has formed a part of some former exhibitions.

POULTRY EXHIBIT.

As heretofore the Plymouth Rocks were very conspicuous, not only in numbers but in quality. Dr. C. M. Cooke's display in this class was particularly effective. White Plymouth Rocks and Orpingtons showed an increase of popularity, while an entirely new bird was seen in the Rhode Island Whites exhibited by Messrs. J. Johnson and J. Andrade. The pens of Leghorns, Wyandottes and Rhode Island Reds also contained many handsome birds. Among the prize winners in the Domestic class, the following names were of frequent occurrence: Mrs. S. I. Shaw, Messrs. J. J. Greene, C. M. Cooke, Jr.; J. F. G. Stokes, L. C. Ables, R. C. Brown, J. Cullen, F. Santos and Dr. C. B. High.

More specimens of the ornamental breeds were in evidence than in former years: Frizzles, Silkeys and Black Polish, being represented with creditable birds.

Among the pigeons the most handsome birds were probably the Jacobins and Pouters, and although the display was not large, the general quality of the birds in this section of the exhibit was distinctly good.

The awards were made by Mr. G. R. Andrews of Fresno, who visited the islands for this purpose.

HAWAII EXPERIMENT STATION EXHIBIT.

The Hawaii Federal Experiment station displayed a very effective exhibit. Prominence was given to Cotton, which is at present causing so much attention locally as a prospective Hawaiian crop. Tobacco and rubber were also given due recognition, which crops together with cotton well represent the potential agricultural energy of the Territory which the Station is doing so much to develop.

One feature of the display was particularly satisfactory to the Forester, for it represents in concrete form the efforts which are being made to develop our own resources and to make our

islands independent of other sources of supply. The specimens of bales of rice-hay and rice-straw are alluded to—the former especially being of such quality as to encourage the hope that it will eventually command much of the local demand.

A house constructed of beeswax together with an observation hive in operation, and specimens of bee products represented the local honey industry.

BUREAU OF FORESTRY EXHIBIT.

The Bureau of Agriculture and Forestry was well represented by a display from each of its Divisions. Of these the one attracting especial attention was the entomological exhibit. It is satisfactory to note from year to year the increasing interest which is being given to this phase of economic agriculture—a result no doubt due not only to the vital part which insect problems play in our local industries, but in particular to the judicious policy of education which is carried out by the Division.

The collection shown by the Division of Forestry well displayed the progress of conservation throughout the islands and epitomized the multifarious work which falls to the lot of this division.

LECTURES.

An agreeable innovation was made by the lectures of Professor B. E. Porter, of the College of Hawaii, on Thursday and Friday evenings. These included the selection and care of Poultry and were illustrated by lantern slides.

LIST OF PRIZE WINNERS.

The entries and the prize winners were:

Barred Plymouth Rock Cock—John Cullen, 1; C. Montague Cooke, Jr., 2 and 4; F. C. Atherton, 3.

Barred Plymouth Rock Hen—F. C. Atherton, 1; C. Montague Cooke, Jr., 2 and 3.

Barred Plymouth Rock Cockerel—F. C. Atherton, 1; C. Montague Cooke, Jr., 2, 3 and 4.

Barred Plymouth Rock Pullet—John Cullen, 1; C. Montague Cooke, Jr., 2, 3, 4 and 5.

White Plymouth Rock Cock—Walter E. Wall, 1; Dr. C. B. High, 2 and 3.

White Plymouth Rock Hen—L. C. Ables, 1; E. R. Bath, 2; Dr. C. B. High, 3, 4 and 5.

White Plymouth Rock Cockerel—Dr. C. B. High, 1 and 3; Walter E. Wall, 2 and 4; H. Jeffs, 5.

White Plymouth Rock Pullet—Walter E. Wall, 1 and 4; L. C. Ables, 2 and 3; Dr. C. B. High, 5.

White Plymouth Rock Pen—L. C. Ables, 1. Walter E. Wall, 2.

Buff Plymouth Rock Pullet—A. N. Campbell, 1 and 2.

Silver Pencilled Plymouth Rock Cock—Frank Santos.

Silver Pencilled Plymouth Rock Hen—Frank Santos.

Buff Wyandotte Cock—B. F. Beardmore.

Buff Wyandotte Hen—B. F. Beardmore.

Buff Wyandotte Cockerel—B. F. Beardmore, 1 and 2.

Buff Wyandotte Pullet—B. F. Beardmore.

Buff Wyandotte Pen—B. F. Beardmore.

Partridge Wyandotte Pen—J. J. Greene.

Silver Pencilled Wyandotte Cock—Frank Santos.

Silver Pencilled Wyandotte Cock—Frank Santos.

S. C. Rhode Island Red Cock—John Cullen, 1, 2 and 3.

S. C. Rhode Island Hen—John Cullen, 2, 3, 4 and 5.

S. C. Rhode Island Red Cockerel—John Cullen, 1, 2, 3 and 4; Frank Andrade, 5.

S. C. Rhode Island Red Pullet—John Cullen, 1, 2, 3, 4 and 5.

R. C. Rhode Island White Cock—Jason Andrade.

R. C. Rhode Island White Hen—Jason Andrade.

R. C. Rhode Island White Cockerel—J. A. Johnson, 1; Jason Andrade, 2.

R. C. Rhode Island White Pullet—J. A. Johnson, 1; Jason Andrade, 2.

R. C. Rhode Island White Pen—J. A. Johnson.

Dark Brahma Cock—Frank Santos.

Dark Brahma Hen—Frank Santos.

Dark Brahma Cockerel—Frank Santos.

Dark Brahma Pullet—Frank Santos, 1 and 2.

Black Langshan Cockerel—Manuel Camara.

Black Langshan Pullet—Manuel Camara.

S. C. White Leghorn Cock—Raymond C. Brown, 1; Mrs. S. I. Shaw, 2.

S. C. White Leghorn Hen—Mrs. S. I. Shaw, 1 and 3; Raymond C. Brown, 2, 4 and 5.

S. C. White Leghorn Cockerel—Mrs. S. I. Shaw, 1 and 2.

S. C. White Leghorn Pullet—Mrs. S. I. Shaw, 1 and 2.

S. C. White Leghorn Pen—Mrs. S. I. Shaw.

S. C. Buff Leghorn Cock—H. Jeffs.

S. C. Buff Leghorn Hen—A. N. Campbell.

S. C. Black Minorca Cock—J. H. Craig, 2.

S. C. Black Minorca Hen—J. H. Craig, 1, 2 and 3.

S. C. Black Minorca Cockerel—J. J. Greene, 1 and 2.

S. C. Black Minorca Pullet—J. J. Greene, 1, 2 and 3.

S. C. Black Minorca Pen—J. H. Craig.

S. C. White Minorca Cock—John Guild.

S. C. White Minorca Hen—L. C. Ables, 1 and 4; John Guild, 2, 3 and 5.

S. C. White Minorca Pullet—John Guild.

S. C. White Minorca Pen—L. C. Ables.

S. C. Buff Orpington Cock—John F. G. Stokes, 1 and 2; Chas. McWayne, 3.

S. C. Buff Orpington Hen—John F. G. Stokes, 1 and 3; Chas. McWayne, 2.

S. C. Buff Orpington Cockerel—John F. G. Stokes, 2, 3, 4 and 5.

S. C. Buff Orpington Pullet—John F. G. Stokes, 2, 3, 4 and 5.

S. C. Black Orpington Hen—Chas. McWayne, 1, 2 and 3.

Spangled Orpington Cock—Chas. McWayne, 2.

White Crested Black Polish Cock—J. A. Fernandes.

White Crested Black Polish Hen—J. A. Fernandes.

White Crested Black Polish Pen—Jos. Rodriques.

Silver Spangled Hamburg Cock—Vernon C. Tenny, 2.

Silver Spangled Hamburg Hen—Vernon C. Tenny, 1 and 2.

Silver Spangled Hamburg Pen—Mrs. H. Jeffs.

Cornish Indian Game Cock—John Markham, 1 and 2.

Cornish Indian Game Hen—John Markham, 1 and 2.

Cornish Indian Game Cockerel—John Markham, 1 and 4; St. C. Sayres, 2; W. C. King, 3.

Cornish Indian Game Pullet—W. C. King, 1 and 2.

White Indian Game Pen—L. C. Ables.

Black Sumatra Game Hen—John Cullen, 1, 2 and 3.

Black Sumatra Game Cockerel—John Cullen, 1, 2, 3 and 4.

Black Sumatra Game Pullet—John Cullen, 1, 2, 3 and 4.

Japanese Game Hen—John Markham.

Japanese Game Cockerel—Mrs. Menaugh, 1 and 5; John Markham, 2; Makino, 3; Jas. H. Cummings, 4.

Japanese Game Pullet—Jas. H. Cummings, 1; Manuel Camara, 2 and 3; John Markham, 4 and 5.

Japanese Shamo Game Cock—H. Jeffs.

Old English Mottled-Breasted Game Cock—H. Jeffs.

Red Cuban Game Hen—F. W. Weed, 2.

Red Cuban Game Cockerel—F. W. Weed, 2.

Australian Game Cockerel—F. W. Weed.

Silkie Cockerel—Philip C. Wong.

Frizzles Cock—W. W. Wright.

Frizzles Hens—W. W. Wright, 1 and 2.

White Bantam Hens—C. F. Herrick, Jr., 1 and 2.

Colored Muscovy Drake—D. P. R. Isenberg.

Colored Muscovy Duck—Frank Santos.

White Pekin Drake—D. P. R. Isenberg.

White Pekin Duck—D. P. R. Isenberg, 1 and 2.

PIGEON CLASSES.

Colored Pouter Cock—Harold P. Hustace.
 White Pouter Cock—Harold P. Hustace.
 White Pouter Hen—Harold P. Hustace.
 White Pouter Pair—J. H. Craig.
 Black Fantail Pair—J. H. Craig.
 Bronze Fantail Cock—Harold P. Hustace.
 White Barb Pair—J. H. Craig.
 Black Barb Pair—J. H. Craig.
 Black English Carrier Pair—W. W. Wright.
 Brown Jacobin Pair—J. H. Craig.
 Yellow Jacobin Pair—W. W. Wright.
 Runts—John Cullen, 1 and 3.
 Black Runt Pair—W. W. Wright, 2.
 Blue Runt Pair—J. H. Craig.
 Dark Blue Runt Cock—W. W. Wright.
 Light Blue Runt Cockerel—W. W. Wright.
 Silver Runt Pair—J. H. Craig, 1 and 2.
 Light Bronze Runt Pair—W. W. Wright, 2.
 Black Homer Pair—J. H. Craig.
 White Burmese Pair—L. C. Ables, 1; J. H. Craig, 2.
 Archangel Pair—W. W. Wright.
 Carneaux Pair—A. N. Campbell, 1 and 2.

SPECIAL PRIZES.

The following special prizes were awarded:

Grand prize medal, offered by the American Poultry Association for best bird in American class—Won by C. B. High.

Same, in Asiatic class—Won by Manuel Camara.

Same, in Mediterranean class—Won by J. J. Greene.

Cup offered for best collection in American class—Won by C. Montague Cooke, Jr.

Same, in Mediterranean class—Won by Mrs. S. I. Shaw.

Same, in English class—Won by John F. G. Stokes.

Cup offered to exhibitor showing largest number of birds in poultry classes, scoring ninety points or over—Won by John Cullen.

Highest score in Hawaiian bred bird in show—Mrs. S. I. Shaw.

Best pen in American class—J. J. Greene.

Same, Mediterranean class—Mrs. S. I. Shaw.

Same, game class—L. C. Ables.

Best conditioned bird—Dr. C. B. High.

Best shaped male in show—H. Jeffs.

Best shaped hen in show—L. C. Ables.

Best parti-colored male bird in show—F. C. Atherton.

Best parti-colored hen in show—F. C. Atherton.

Best solid-colored male bird in show—J. J. Greene.

Best solid-colored hen in show—Walter E. Wall.

BOARD OF AGRICULTURE AND FORESTRY.**Division of Forestry.**

ROUTINE REPORT.

Honolulu, February 3, 1909.

Board of Commissioners of
Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen: I have the honor to submit the regular report of the Division of Forestry for the month of January. During this month my own time has been mainly devoted to the preparation of the annual report of the Division of Forestry for the calendar year 1908, and to matters connected with the routine work of the Division.

For the fourth annual exhibition of the Hawaiian Poultry Association the Division of Forestry united with the other Divisions of this Board in making an exhibit illustrating the work in progress. Maps and charts describing the forest reserves, plants from the Government Nursery showing methods of nursery procedure and a case of herbarium material were the features of the Division of Forestry's exhibit.

On Monday, January 11, there occurred a forest fire on the land of Kauhako, South Kona, Hawaii, "about a quarter of a mile from the Court House above the government road." The fire was reported on January 14 by Honorable John D. Paris, the District Fire Warden. The fire was at once got under control by people in the neighborhood. Although it started up again the next day it was finally extinguished without much damage being done, the fire being put out before it reached the edge of the forest. Mr. Paris does not say how large an area was burned over.

The distribution of the Year Books of the United States Department of Agriculture, received some little time ago from the Delegate to Congress, Honorable J. K. Kalaniana'ole, has now been completed. By the last mail there was received from him a consignment of vegetable seeds for distribution. Arrangements are now being made with the Department of Public Instruction whereby this seed will be distributed to the different families represented in the several public schools. Later, notices will be given in the papers that will lead to its general distribution among those who are not reached in this way. Altogether the quota received consists of 10,000 packages of vegetable seeds and 320 packages of flower seeds.

On January 16, Mr. Herbert Kinslea, the Clerk of this Divi-

sion, resigned to accept another position. On January 21, Mr. Francis Evans was appointed as his successor.

The annual report is now in the printer's hands, the first installment of copy being turned in to the Hawaiian Gazette Company on January 27.

In other respects the work of the Division of Forestry has been in accordance with plans already outlined at length.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

Division of Entomology.

DIVISION REPORT FOR JANUARY, 1909.

Honolulu, Hawaii, February 1, 1909.

Honorable Board of
Commissioners of Agriculture and Forestry,
Honolulu, T. H.

Gentlemen: I have the honor to report upon the work of the Division of Entomology for the month of January.

INSPECTION.

As always, inspection had greatest claim on our time and attention. We boarded thirty vessels and found seventeen of them brought more or less articles for our inspection. The result is shown in the following:

TABLE OF INSPECTION.

<i>Disposal With Principal Causes</i>	<i>Lots</i>	<i>Parcels</i>
Passed as free from pests.....	361	10,606
Burned infested Oriental plants and fruit.....	29	91
Fumigated for white fly, scale bugs, etc.....	4	5
Scabby potatoes ordered returned.....	5	405
Total examined.	509	11,107

THE ORIENTAL IMPORTATIONS DESTROYED.

It is noteworthy that all of what was destroyed this month came from the Orient. Some of this included two boxes of

oranges, one of sand pears, and one of apples badly infested by evidently destructive fungi; two cherry trees badly infested with the destructive West Indian peach scale (*Aulacaspis pentagona*), and a lot of oranges with undetermined scale. From among the freight we were obliged to destroy thirteen lots of yams from China because of evidence of destructive fungi; six lots of pomelos and one of oranges because of a variety of scale bugs and danger of fruit flies. Altho this inspection of dutiable goods is a terrible tax on our time and patience we take the utmost precaution with these articles because of the danger lurking in some of the diseases they bear. We do not want another taro disease or sweet potato disease.

ANNUAL REPORT.

Fortunately the work of inspection relaxed somewhat the last week of the month giving us time to prepare the Annual Report for the last calendar year. This is ready at this writing and expected to be in the printers' hands tomorrow.

Yours respectfully,

JACOB KOTINSKY,
Superintendent of Entomology.

Division of Animal Industry.

REPORT OF THE TERRITORIAL VETERINARIAN.

Honolulu, February 3, 1909.

Mr. President and Members of the Board: I beg to report on the work of the Division of Animal Industry since the last meeting of this Board on January 13, 1909.

IMPORTATION OF LIVESTOCK FROM NEW ZEALAND.

On January 16 one of the imported New Zealand rams which were kept in quarantine in Kalihi quarantine station died as a result of an accident. This makes the loss of two rams out of a shipment of 105 head from the time they left New Zealand.

On January 19 the requisite quarantine period of 15 days from the date of arrival of the sheep was up and the animals were divided and submitted to a final inspection, after which

they were released from quarantine, and having been duly entered into the Territory, were, with the consent of the Collector of Customs, shipped to their respective destinations, that is, the Island of Lanai and the Humuula Sheep Station.

The sixteen bulls, which arrived from New Zealand at the same time with the sheep, are still confined at the Beach Road quarantine station where they will be kept until March 18, the requisite quarantine period for these animals being 90 days from the date they left New Zealand. I have, however, corresponded with the Chief of the Bureau of Animal Industry and asked if it would not be possible to have this quarantine reduced to 60 days in consideration of the isolated position of this Territory stating that the animals are in perfect health and that the expenses connected with the quarantine will add materially to the already very considerable expenses connected with this importation.

The Beach road quarantine station was originally built for horse stock only, so in order to save feed a new hay-rack has been constructed as it was impossible for the bulls to reach up to the racks provided for horses and mules.

U. S. FIFTH CAVALRY HORSES.

As stated in my last report 12 horses out of the 502 head which arrived here on January 12 and belonging to the U. S. Fifth Cavalry were placed in quarantine at the Quartermaster's corrals in Iwilei. One of these animals developed pneumonia and died on January 18. The rest have all recovered from their indisposition subsequent to shipment and have been released from quarantine and allowed to join the regiment at Leilehua.

On January 17, I went to Leilehua and in company with the regimental veterinary surgeon inspected the horses which were all found to be doing well.

POLICE COURT.

The case of Stodard versus Lee Sin, the latter being charged with selling a horse which he knew to be affected with glanders, was called in the police court on January 20. I testified in behalf of the prosecution and the judge reserved his decision, and, I understand has called for a new hearing.

ARRIVAL OF LIVESTOCK.

Since my last report there have only arrived two horses for Walter Dillingham and two horses for H. Hackfeld & Company; the former were quarantined on the premises of the owner and the latter at the Beach road quarantine station. A number of dogs have also arrived.

REPORTS OF DEPUTIES.

Dr. Elliot reports from Hilo that the extensive outbreak of endemic catarrhal fever which has been prevalent throughout his district for several months is abating and that he has the glanders situation well in hand.

Dr. Fitzgerald of Maui has requested that 200 doses of mallein be sent to him for the purpose of testing all of the horse stock of a large plantation and the same has been forwarded.

ANNUAL REPORT.

The principal part of my time has been taken up in the preparation of the annual report of this Division which will go to the printers by the end of this week.

Very respectfully,

VICTOR A. NÖRGAARD,
Territorial Veterinarian.

INDEX TO VOLUME V.

The Title Page, Index and Table of Contents of Volume V of the Hawaiian Forester and Agriculturist accompany this number.

BY AUTHORITY.

 BRUSH FIRES ON TANTALUS.

Notice is hereby given that in accordance with Section 6 of Act 71 of the Session Laws of 1905, it is FORBIDDEN to start fires for the burning of brush, dry grasses, etc., for a period of twelve (12) months from date, within that portion of the District of Kona, Island of Oahu, bounded on the East by Manoa Valley, on the North by the Konahuanui Mountain Ridge, on the West by Nuuanu and Pauoa Valleys (including the forested portion of the ridge above Pacific Heights), and on the South by the makai edge of the Eucalyptus forest, the Makiki Reservoir and the mauka boundary of the Judd land in Makiki and Manoa, UNLESS the written permission of the District Fire Warden has been first obtained.

The law reads "such fires shall not be started during a heavy wind without sufficient help present to control the same, and the fires shall be watched by the person setting the same, or by competent agents of his, until put out."

The District Fire Warden is Mr. W. M. Giffard.

RALPH S. HOSMER,
Chief Fire Warden.

Honolulu, Hawaii, February 13, 1909.

POULTRY RAISING IN HAWAII.

By B. E. Porter, Professor of Animal Husbandry, College of Hawaii.

The following article contains so much valuable information to prospective poultry raisers in these islands that it is reprinted from the Pacific Advertiser.

Poultry culture has many peculiar and particular attractions to old and young. A fine flock of well kept fowls is certainly a very great pleasure as well as a source of income to the family. And the care of poultry offers ample opportunity for the abundant exercise of both brains and muscles by men and women of almost all conditions of life.

Whenever poultry is kept, it is with a definite purpose in mind. Such a purpose may be for pleasure or profit, or both. Many families keep a few fowls to use up the waste food materials about the home, furnish fresh eggs, beautify home surroundings, or provide recreation to the head of the family when he comes home from professional duties. Then besides all this pleasure the profit which can be derived is no mean item for any family to consider at the present time.

When poultry is kept for profit alone the situation changes. Then it is more serious business for so many problems confront the poultryman. Some will immediately say, "What must I do to insure a reasonable amount of success?" The answer is study and work.

There could certainly be no more favorable conditions for poultry keeping than we have here within our own midst. In fact some men are frank enough to say that things are almost too favorable, so that people do not take the necessary precautions and care for their fowls. It is true that some grain foods are high, but market prices are good for both eggs and table birds.

The reinforcements to the army and navy, together with the advance in prices of meats make the opportunity for successful poultry keeping so much more promising.

Statistics are dry things, but sometimes they show results that are a revelation to the uninitiated. According to the Bureau of Statistics, the value for the import of eggs alone has been for 1906, \$12,995; 1907, \$14,943. and 1908, \$16,511. These figures show an increase of almost \$2000 each year. For a young man with enterprise and push such figures look particularly inviting, for there is a possibility that he can have a goodly share of such money as returns on his business.

At best, poultry raising cannot be carried on in a haphazard sort of way or because a neighbor makes \$10 a week with fowls. To make a profit on poultry, as in any other line of successful

business endeavor, the personal equation must be solved. An inventory of personal habits and characteristics is essential.

In order that this taking account of stock may be thorough and quite complete, let us consider what these qualities may include.

QUALIFICATIONS OF A POULTRYMAN.

First of all he must have a particular liking for animal life and, you may say, a love for good, lively, healthy looking birds. He needs the qualities of the brightest merchant. To be successful he should be sagacious and shrewd, capable of planning well and executing completely.

To get along well he must have a system developed in all its details, and be regular in his habits. The crowning characteristic is the quality termed "common sense." Then again, he must be a student of market requirements, tireless in his attempts to satisfy a market with high quality poultry products put up in attractive packages. He should be a student of principles of breeding, methods of improvement, and factors of feeding and never be self-conceited, which limits progress.

Let the poultryman decide to make poultry his life study, using the instruction gained, profiting by the experience of other poultrymen, acquiring wisdom from his own successes and failures, and always welcoming any new practical ideas which will help on his poultry progress.

LOCATION OF POULTRY YARDS.

For the beginner, the location of yards or the amount of land which can be utilized for poultry, must receive attention first. It does not take much room for a small flock, but chickens are best with plenty of range. Some of the mainland experiment station workers have found that a four months' chick on free range would equal in weight a five months' chick on the pen range. A place with some sand in the soil is preferred for this reason that it allows more perfect drainage in wet weather.

The necessary buildings for the beginner, in this climate, need not be very expensive. The principal thing in building, however, will be protection against wind, rain, dampness, rats, and other pests. Trees and hedges can be made to afford protection from the sun if the hens and little chicks so desire. It is also, quite often, desirable to screen in the roosting quarters so that the hens may be free from annoying mosquitoes at night.

SELECTING STOCK.

When commencing poultry raising it is advisable to select stock for a particular line of production. Let the stock be

oted for egg production or fancy broilers. The market is good for both kinds of birds. Don't have dual-purpose fowls. Have specialists; then the breeding and feeding problems are more easily solved.

For egg production, select breeds from the Mediterranean class, and for broilers choose an American or Asiatic variety. An American or Asiatic fowl may lay as many eggs as the lighter breeds but when results are totaled the economy of production is usually in favor of the smaller hen, because her cost of maintenance is less.

To have a flock of good laying hens, special attention must be given to their selection. If possible, get pullets from breeders who are reliable and are known to have good birds.

Ordinary fowls may do until the flock can be replaced by others from a breeding flock which has been selected with special care.

The inexperienced poultryman will find that breeders recognize that a laying hen has a particular type and form closely correlated with egg production. A laying hen is not fat. She has a red comb, a clear eye and a hearty appetite. In form she has a long body, wide in the breast for a large craw, flat and wide in the back and is not heavy in the region of the fluff.

The male bird for the breeding flock should not be anything but the best. A knowledge of the laws of breeding will help the beginner to understand why good prices are asked and received for superior stock.

After the buildings are built and the fowls put in the yard, real work begins. Care must be given to the feeding so that the hens will not get overly fat and cease laying.

Vermin and disease must be kept off the fowls. Water, grit and shell forming materials are needed. Records should be kept so that the poor-laying hens can be removed from the flock. Trap nests are valuable for such work. Many who were at the recent poultry show remember the model presented by the College of Hawaii.

The recent exhibition was a decided help. There breeders brought together the result of their best efforts, which were, indeed, highly commendable. The fowls exhibited showed high quality and gave evidence that some masters in the art of breeding and conditioning stock had been at work. Their work fully demonstrated the fact that they were close students of superior fowls and the Standard of Perfection, which, by the way, should be in the hands of every breeder.

Poultry culture is a vocation which gives ample opportunity for the deepest study, unlimited play for the best talents and abundant room for the most skilful practise. The poultryman of today, who is equipped with a natural inclination for the calling, interested in the industry, trained in all the care

and management of the fowls, especially educated for the business and not afraid to work hard with both brain and brawn, is prepared to act with intelligence and may become not only a successful breeder of thoroughbred poultry and producer of high class poultry products, but also a public benefactor and an honor to his state and country.

THE HAWAIIAN TOBACCO INDUSTRY.

By Jared G. Smith.

Being a communication to the Committee of Ways and Means of the Legislature of the Territory of Hawaii.

There are three de facto tobacco growers in Hawaii (November, 1908), The Kona Tobacco Co., operating in Kona and Hamakua, on the Island of Hawaii; one farmer in South Kona, and one farmer in Hamakua. The crop already harvested is 3500 pounds, and 4000 pounds additional will be cured by December 31.

One new corporation has been formed which expects to begin operations about February, 1909, with a capitalization of \$100,000. Two other corporations are in the promotion stage, one on Hawaii and one on Maui.

The Kona Tobacco Co. is capitalized at \$25,000. Officers: J. G. Smith, H. P. Wood, A. Coyne, C. L. Beal and R. W. Perkins. The Kona Tobacco Co. and the two farmers who are growing for us under contract produce only Cuban leaf. Two of the corporations forming on Hawaii plan to grow only Sumatra leaf, and I believe the Maui company intend growing Sumatra only.

The Kona Tobacco Co. will harvest sixty acres of Cuban leaf in 1909.

CUBAN TOBACCO.

The tobacco plant is believed to be a native of Cuba and other West Indian islands. Cuban tobacco is considered the best cigar leaf grown anywhere.

Cuban tobacco is both filler and wrapper and is distinguished by its high flavor and aroma, fine texture and usually good burn.

There are two main types of Cuban leaf: Vueltas, including all leaf grown on the western end of the island, and Remedios, from the Santa Clara district. Remedios are cheap, heavy filler tobaccos of high flavor, dark in colors, and usually poor burn.

Vueltas comprise three-fifths of the crop and comprise the best Cuban cigar leaf, both filler and wrapper.

The estimated crop of Cuba for 1908 is 550,000 bales (of ninety pounds each). It is the first good crop, as far as quality goes, in four years.

The Cuban area planted in tobacco is 70,000 acres.

The duty on Cuban filler is twenty-eight cents gold per pound; on wrapper, \$1.48 per pound, on stemmed wrapper \$2.00 per pound, Cuban duties being twenty per cent. less than those on goods from other foreign countries. The duty on unstemmed wrapper is practically less than \$1.48, because filler may contain fifteen per cent. of wrapper leaf and still be admitted on payment of filler duties. Filler containing more than fifteen per cent. wrapper leaf pays the higher duty.

England is the largest buyer of Cuban tobaccos. Germany is second in quantity (buying mostly Remedios and other cheaper grades), and the United States is second in values and third in quantity.

HAWAIIAN GROWN TOBACCO.

Hawaiian-grown tobacco from Cuban seed is of the Vuelta type, of fine texture, unexcelled burn, good body, mild aroma and flavor, and running largely to light colors, making it an excellent wrapper leaf.

There are 30,000 acres of virgin tobacco land in Hawaii, capable of sustaining a large and profitable industry. The best tobacco lands in Cuba have been cropped continuously in this crop for one hundred years or more, so that there has been marked deterioration in yield and quality. The 1908 crop is the first crop of good, sound, workable leaf since 1904.

The yield of Cuban leaf in Hamakua in 1908 has been over 1000 pounds per acre, while the average Cuban yield does not exceed 600 pounds.

The superior burning qualities of the Hawaiian-grown Cuban leaf will sell it in any market, and four years out of five Cuban leaf will not burn.

The maintenance of the present duties on tobacco are necessary if a tobacco industry is to be built up in Hawaii. Brazil grows just as good tobacco as Cuba and has twenty times the area of tobacco lands in Cuba, Porto Rico and Hawaii combined. A reduction of the duty on tobacco would bring ruin to the whole tobacco industry of the United States, and Brazil alone would do to the whole of the American tobacco industry what she has done on a smaller financial scale to the coffee industry of Hawaii, Porto Rico and the Philippines.

The American tobacco industry is an enormous one, the total production of the United States exceeding 880,000,000 pounds. The production of domestic cigar leaf exceeds 300,000,000 pounds annually. This gigantic industry would be wiped out if the duty should be removed from foreign tobaccos.

SUMATRA TOBACCO.

The Sumatra tobacco coming to the American market is a wrapper leaf only. The United States imports about 40,000 bales (of 170 pounds) annually.

The total yield of the Deli district of Sumatra in 1900 was 223,000 bales, amounting to 36,915,000 pounds, valued at thirty-seven cents per pound.

"The duty paid is \$1.85 per pound on wrapper and \$2.50 per pound on stemmed wrapper.

"England is the chief buyer of Sumatra wrapper leaf; then, in order, Germany, Austria, the United States and France. The duty on Sumatra tobacco imported into the United States averages \$12,500,000 per annum.

The average yield of Sumatra tobacco is about 750 pounds per acre. There are about 50,000 acres planted in Sumatra.

The qualities of wrapper leaf are that the tobacco should be extremely thin, silky, elastic, of good body and burn, but without flavor and aroma. For the American market the colors must be "claro" and the sizes extraordinarily large.

The European market which absorbs eighty-three per cent. of the Sumatra crop, takes dark colors, and lengths mostly under sixteen inches. The American market takes all light colors and lengths over sixteen inches. The demand for "claro" is so strong in the United States that Sumatra planters are adopting hothouse methods to produce enormous leaves.

The average of the first grade of Sumatra wrappers is so high as to size and delicate silkiness and thinness that one pound of leaf will cover sixty-five to seventy square feet.

The cultivation of Sumatra wrapper leaf under cloth has for its object the simulation of tropical out-of-doors climatic conditions, all to produce large thin, silky leaves in light colors, such as the American market demands.

The labor conditions in Sumatra are interesting.

The Mexican dollar, valued at approximately \$0.50 gold, is the wage unit. The laborers are Chinese coolies and Klings from Madras, India. The coolies are employed under three-year contracts, the contracts quasi-free, but no laborer can leave Sumatra unless he is provided with a passport indorsed by his last employer.

The wages during the first year of the contract are \$45 Mexican per annum. The laborers, if green hands, plant no tobacco the first year, but are employed in clearing land, building ditches, roads and preparing the fields for cultivation.

The second and third years the coolies are paid at the rate of \$60 to \$80 Mexican for the nine months of the tobacco campaign, and \$45 Mexican for the remaining three months of the year.

LOCAL RUBBER OUTLOOK.

At the present time, when the development of the Hawaiian Rubber industry is nearing that point when the product may be expected to figure among our exports, any information concerning our local conditions and prospects is cordially welcome. The presence of Mr. F. G. Wallace, who is not only conversant with the conditions of rubber cultivation generally, but is the manager of a plantation in the Malay Peninsula, has afforded an opportunity of comparison between our own plantations and those which have set the standard of success to the rubber world. In the quotation from Mr. Wallace that follows, it will be seen that together with many of our own local agriculturists, he, too, expresses some doubt as to the suitability of the Nahiku district for the purpose. However those who have seen the Nahiku trees, are agreed that even if the local climatic and other factors which go to the perfection of rubber growing condition, are somewhat at variance with established ideals, there must be some other subtle beneficial influence at work which more than offsets the more apparent qualities which are lacking. After all the evident agricultural factors usually taken cognisance of, such as rainfall, soil constituents and climate, there is evidently yet to be considered a certain elusive local equation, which at Nahiku must be a very beneficial one for the development of the rubber tree. The recent remark of Mr. Dillingham at a meeting of local rubber men, that it has been his experience that those crops which can be grown in Hawaii are generally not only up to market standard, but even a little better, will be recalled in this connection, and would appear to give support to the idea that there is a local quality to be reckoned with, even after the statistician has tabulated our qualities and reduced us to exactly fit the niche to which book lore would relegate us.

This is not written in any way to detract from the remarks of Mr. Wallace, but rather as a comment on what has so often been said of Nahiku and of the whole islands. The suggestions and advice which follow are well worth serious consideration and there is no hesitation in saying that the best Hawaiian rubber plantation would greatly benefit by carrying them out.

Mr. Wallace said substantially as follows:

"I certainly think that the rubber industry in Hawaii can be made to pay if it is carried on in the same way as it is in the Malay Peninsula, even with the high price you have to pay for labor, but I am positive that the plantations will not pay the dividends that we would like to see unless they are put into thorough cultivation right away.

"As regards the situations of the plantations I have visited, although I have not seen much of the country apart from the Nahiku district, I think that more suitable land for rubber plant-

ing might have been obtained. While there are patches of very good rubber land at Nahiku there are at the same time parts on which rubber is planted that will in my opinion never grow good trees. First, on account of their being too high and wet. Second, on account of their being too much exposed. While at Nahiku I saw Ceara trees near the sea which had lost their leaves owing to their having been shriveled up by the storm of a couple of weeks ago. This in my mind must have very bad effect on the trees by retarding their growth.

"The Ceara at Nahiku seemed to be doing better than the Hevea but I put this down chiefly to practically all of the Hevea having been stunted at the start, also from not having been planted in the right way. There are parts up in Nahiku, in the more sheltered parts, where I think that with proper planting, draining, and cultivation, Hevea would grow well. The trouble with Nahiku in my mind for Hevea is as follows: The lower land is too near the sea (and thus is exposed to the salt air, which rubber trees cannot stand), while the upper land is too high, cold and wet.

"I think a grove of trees such as I saw at Kohala and Nahiku landing could be made to pay with labor conditions they are here, but to do so they must have proper cultivation and drainage. The growth of well kept Ceara trees here, is think as good as the growth of well kept Hevea trees in Malay Peninsula, and if the growth is not retarded by lack cultivation, I see no reason why you should not be able to grow fine rubber producing trees.

"In Malay, Hevea trees are generally planted from stumps from six to twelve months old. The stumps are pulled out of the ground and the tap root is cut so as to leave only from six to ten inches. The lateral roots are also cut off about a quarter of an inch from the stem. The stump itself is cut off about two inches above the brown part, which in the case of a six month old stump, would give us a stump about three feet high. We dig a hole about fifteen inches square and fifteen inches deep, which we fill up again with surface soil and then plant the stump. In planting, care must be taken to have the loose earth around the stump packed solid and also to bury more material underneath in the nursery.

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WOMEN OF HAWAII'S CONSERVATION MEETING.

On March 3rd, in response to an invitation of the College Club of Honolulu, a large and influential gathering of the women of Hawaii assembled at the residence of Governor and Mrs. Frear to take part in a meeting called to discuss the necessity of conserving the natural resources of the Islands. At the time of the National Conservation Commission there was also held at Washington the first meeting of the Woman's National Rivers and Harbors Congress, at which were representatives from a large number of States. Among these Mrs. A. F. Knudsen was present in the interests of this Territory and took an influential part in the proceedings of the Congress.

Actuated by the hope that Hawaii take its part in the great national movement now in progress, Mrs. Knudsen has returned to Hawaii with the desire of organizing the women of the islands to assist in the national work of the mainland association. Although this Territory has for some years on the part of governmental, corporate and individual interests alike, shown a noteworthy example of operative conservation methods, still the initial work only has been achieved, and the great scheme lies yet unaccomplished. In helping to carry out this great policy none are more competent than the women of Hawaii, and their entry in the lists assures the cause which they have championed a fullness of success otherwise impossible. By their encouragement and inspiration, by their influence and perseverance, by their disinterestedness and enthusiasm, this work is at once elevated above the conflicting interests of ordinary affairs, to a plane where it is seen the one great objective of all who have the prosperity of Hawaii at heart.

Before returning to the islands, Mrs. Knudsen was the recipient of letters from President Roosevelt, the Hon. James R. Garfield and the Hon F. H. Newell, who encouraged her in her desire to organize the women of Hawaii in the interests of conservation and assured her of their assistance and support.

The principal addresses at the meeting of March 3rd are published herewith, together with copies of the letters referred to above:

MRS. KNUDSEN'S ADDRESS.

Madam President, Ladies and Gentlemen:—I thank you for the opportunity given me to speak to you on a subject which of all great questions is the most important one before the American people today; a question which deals not only with the present needs of this great Nation, of which Hawaii is a part, but more especially with the needs of the generations in all time to come.

This great movement, the Conservation of the National Resources of the United States, the commencement of which is due to the genius of the Hon. Gifford Pinchot, is of all the broad and progressive movements of the last eight years, the one that will make President Roosevelt's administration stand out in history as that of lofty purpose and high ideals, practically realized.

Surely the psalmist was right when he sang in the days of old, "Oh Lord, the earth is full of thy riches." Because we recognize more fully even than David did, the bounty of the Creator, have we the right to exhaust nature's rich supply of coal, oil and mineral, allow the soil to be washed into the mighty deep, by the swollen rivers carrying death and destruction in times of flood, leaving this fair land impoverished, a miserable heritage to our children's children?

From the depths of the darkest coal mine to the loftiest height of the brilliant snow capped mountain, from the tiniest stream in the forest to the mouth of the greatest river, comes a voice to those who have ears to hear, "Conserve the vast riches within the earth, preserve the forests, control the rivers, so that in all time to come, you the people of this great nation can sing, 'I will lift up mine eyes to the Hills whence cometh my help. Oh Lord, how manifold are thy works, the earth is full of thy riches.'"

This nation, through the inspiring influence of our great national leaders, is thoroughly aroused to the absolute necessity of preserving and conserving the natural resources, for upon that depend the promotion and perpetuation of our national prosperity.

To consider this far-reaching question there convened in Washington last May, at the White House, a body of the strongest executives this country has ever known.

Before adjourning, this Conference of Governors drew up a Declaration of Principles, signed by each Governor, from which I quote the following:

DECLARATION OF PRINCIPLES.

"We, the governors of the States and Territories of the United States of America in conference assembled, do hereby

declare the conviction that the great prosperity* of our country rests upon the abundant resources of the land chosen by our forefathers for their homes, and where they laid the foundation of this great nation.

“We look upon these resources as a heritage to be made use of in establishing and promoting the comfort, prosperity and happiness of the American people, but not to be wasted, deteriorated, or needlessly destroyed.

“We agree that our country’s future is involved in this; that the great natural resources supply the material basis upon which our civilization must continue to depend, and upon which the perpetuity of the nation itself rests.

“We agree in the light of the facts brought to our knowledge and from information received from sources which we cannot doubt, that this material basis is threatened with exhaustion. Even as each succeeding generation from the birth of the nation has performed its part in promoting the progress and development of the Republic, so do we in this generation recognize it as a high duty to perform our part; and this duty in large degree lies in the adoption of measures for the conservation of the natural wealth of the country.

“We declare our firm conviction that this conservation of our natural resources is a subject of transcendent importance which should engage unremittingly the attention of the nation, the States, and the people in earnest coöperation. These natural resources include the land on which we live and which yields our food; the living waters which fertilize the soil, supply power, and form great avenues of commerce; the forests which yield the materials for our homes, prevent erosion of the soil, and conserve the navigation and other uses of the streams; and the minerals which form the basis of our industrial life, and supply us with heat, light, and power.

“We recommend the enactment of laws looking to the prevention of waste in the mining and extraction of coal, oil, gas, and other minerals with a view to their wise conservation for the use of the people, and to the protection of human life in the mines.

“Let us conserve the foundations of our prosperity.”

From this great convention was formed the National Conservation Commission, which in December last, met in Washington, D. C., at the same time two other congresses were convening. At one, the National Rivers and Harbors Congress, in which every State and Territory in the Union was represented, there were present five thousand men. The other was The Woman’s National Rivers and Harbors Congress, holding its initial convention.

This organization was formed in Shreveport, Louisiana. The Hon. Joseph E. Ransdell, President of the National Rivers and Harbors Congress, realizing that woman’s enthusiasm and

zeal are strong factors in bringing about desired results, urged the women of Shreveport to form a Woman's National Rivers and Harbors Congress, to work in coöperation with the Men's Congress. A ready response was found in the minds and hearts of the women of Shreveport, who know only too well the waste and desolation caused by the Mississippi. An organization was formed. The presiding officer chosen is Mrs. Hoyle Tomkies, a refined and cultivated woman, whose enthusiasm has set aglow the hearts of many women from Maine to Hawaii, to work in this great, comprehensive cause.

At the first convention of the Woman's National Rivers and Harbors Congress, held December 9, 10, 11, in Washington, D. C., there were about twenty states represented, and after the interesting sessions, each woman delegate returned to her respective state with the intense desire to arouse the women to be up and doing in this splendid work, by talking conservation, by coming into the organization, by educating the children to the responsibility that will soon be theirs in saving and conserving their country's natural resources.

At this convention some of the strongest members of Women's National and State Clubs lent their influence. Among them were Mrs. Donald McLean, President of the Daughters of the American Revolution; Mrs. Lovell White of San Francisco, the leading club woman of California; Mrs. N. C. Story, President of the Woman's Federation of Clubs in New York State, and Miss Janet Richards, one of the most progressive and brilliant women in the United States, whose lectures on current topics are attended, twice a month in New York, Philadelphia, Baltimore, Richmond and Washington by hundreds of the most cultured and leading women of each city. In her lecture on conservation she spoke particularly of the splendid part the women are taking in thus coöperating with the men in the conservation movement. She drew the attention of her audience, consisting of about four hundred women, to the interest that far away Hawaii takes in national affairs, of the progressive spirit among the women of this beautiful land, and closed her tribute to the Islands by saying that she predicted that at the next biennial convention, in 1910, at Washington, Hawaii would show a larger membership in the Women's National Rivers and Harbors Congress, in proportion to its population, than any other state or territory in the Union. Let us do our best to fulfil her prophesy.

At this initial session the pioneer women in this conservation movement, had the honor of being addressed by the Hon. Gifford Pinchot, who emphasized the necessity of educating the children in the public schools along this line, "so that the duties and obligations of true conservation be bedrock principles in their lives." The Hon. F. H. Newell also addressed

the women, giving Hawaii marked prominence in his delightful and instructive remarks.

Governor Frear was invited to give an address, but urgent demands upon his time at the Capitol prevented his responding. His influence, however, was felt in the sessions, even if he could not be there in person.

On Thursday evening, December 10, there was held a joint meeting of the National Rivers and Harbors Congress and of the Women's National Rivers and Harbors Congress.

Mrs. Hoyle Tomkies, President of the Woman's Congress, addressed this large convention and as she stood on the platform among some of the foremost men of the nation, she was the personification of feminine beauty and daintiness, and at the same time expressing masculine strength in her deep insight into the country's need, in her firm purpose and undaunted courage.

After Mrs. Tomkies had so ably represented the women, President Ransdell expressed his great faith in the power of women to educate the public mind to the necessity of carrying on this great work, predicting that with their organized coöperation from Maine to Hawaii, the time would come more quickly when Congress would listen to the demands of the people and appropriate \$50,000,000.00 annually for the next ten years for the sake of preserving, conserving and improving the nation's natural resources.

The platform adopted by the Woman's National Rivers and Harbors Congress is as follows:

PLATFORM.

"The Woman's National Rivers and Harbors Congress advocates a policy and not a project.

"It will stand for a broad and liberal policy by the National Government for the development of our inland waterways and harbors and the extension of our forests, as one problem. Rivers and forests are interdependent. Nature has indissolubly linked these two greatest physical resources. 'Their improvement should be vigorously met, together, and at once.'

"We believe that our natural resources should be conserved and developed in a national way, and that such development is only possible by a national agency, whose policy it would be to secure for the entire country, irrespective of section, division or State, the greatest benefits at the least expense.

"We believe that the United States has reached the critical stage from the wanton waste and neglect of its natural resources, that the people—everywhere—of all classes and conditions, must pause and take counsel for the best methods of conservation, and that immediate action is necessary to save these basal factors of civilization.

"We believe that it is the duty of the governments, National and State, and every individual, to coöperate in the following out of some comprehensive plan, outlined by experts and approved by the National Government.

"And we urge all who believe in this policy to join with us in a demand to the Federal Government for laws and appropriations for this great work, which when accomplished will place our Nation in her rightful position among the nations of the earth, and will secure to all future generations their lawful heritage of water, forests and soil.

"To accomplish this necessary development of our Nation's waterways and harbors, we ask that the Federal Government make an annual appropriation of not less than \$50,000,000.00, and that such other appropriation shall be annually made as shall provide adequately for the extension of our Nation's forests."

Since the convening of these two Congresses in Washington, which express the intense interest nationally in this great movement, President Roosevelt has extended his influence along this line of work into Canada and Mexico, making the work now continental.

Mr. Pinchot, the last of December, carried the gospel of Conservation to the Governor General of Canada and the President of Mexico, the result being an international conservation congress with delegates from these two governments together with a large gathering of diplomats, statesmen and other leaders of our own country, convening February 18.

In regard to this comprehensive policy of the President allow me to quote from one of our daily papers:

"When it comes time to write of the man now at the White House and define his place in history, it will be found that his persistent work in awakening the national conscience and the national spirit will have first rank among his public undertakings. Most of us are too near sighted to begin to appreciate what he has accomplished already in bringing the people to an understanding of the waste and profligacy that have been permitted in the nation and the failure to take advantage of the blessings provided by nature. Roosevelt has been prophet and patriot and practical politician. He has been exhorting, warning and demanding.

"There are many today who regard the President's efforts to arouse the country on the conservation of natural resources as the greatest act of real statemanship of the past decade and the crowning work of his administration. As time passes more and more will so regard it, while the enlistment of Canada and Mexico in the great work makes Theodore Roosevelt an American leader in the broadest geographical sense."

We here in Hawaii occupy a unique position not only in the nation's, but the world's work, geographically, and hence

commercially. Whatever makes for national welfare makes for the welfare of these Islands, so in working for national improvement, we necessarily are working for that which will bring to these Islands a lasting benefit.

The subject of deep inland waterways is so intimately connected with the subject of oceanic commerce that they cannot be separated. Well may we of Hawaii be intensely interested in a Federal appropriation for the building of deep inland waterways along the Atlantic seaboard and in the Mississippi Valley. For with the completion of the Panama Canal, it will mean not only an increased trade between these islands and the mainland states at greatly reduced freight rates, but also an increased commercial intercourse between the Orient and the Occident.

"Westward the course of empire take its way"—and in these days surely that prophesy is being fulfilled, with Hawaii placed in mid ocean, by the hand of Providence, to play her important part in the world's great progress.

One of prophetic vision may see in the years to come, when China has awakened, and our nation with a population outnumbering Europe, this greatest of all oceans as the highway of the world's greatest commerce, the Occident and the Orient paying their tribute to progress in their mighty interchange of material wealth, more and more bound by the ties of brotherly love because becoming more *at one* in the knowledge of laws that make for mental and spiritual progress.

Midway between these two tremendous expressions of national power lies fair Hawaii with all that nature has of beauty to bestow. "Paradise of the Pacific" she has always been, but now "Gibraltar of the Pacific" as well. She is the military, naval, and sanitary out-post of defense to America's western shores. No war vessel can leave the Orient, cross the Pacific, do effective work on the western coast of the United States and return without coaling at Hawaii.

Important as these Islands are as a military stronghold, still more important are they, as the commercial cross roads of the Pacific. So significant is the position of Hawaii, and the extent and character of Pearl Harbor, that years ago President Tyler and his Secretary, Daniel Webster, enunciated a sort of special Monroe doctrine for Hawaii, which was maintained by the succeeding President until the time came when Hawaii became part of the Great Republic.

Other nations beside America have been strong factors in bringing Hawaii into such rapid national importance. The Spanish war brought about the annexation of Hawaii. The Japanese question developed her into a military and naval stronghold. Now the harbor development so necessary for the nation's commerce, with well spent millions from the national government is progressing. Let us hope that in the

future Oahu will not be the only island with a fine harbor as the result of Federal appropriations. Every island in this group should have a harbor where perfect safety and comfort are assured passengers in embarking. I speak with feeling on this subject and I know that friends of mine in this room would gladly use their influence to get an appropriation for such a long felt want, a good harbor on each of the other islands.

In time to come our forests will be amply protected, our harbors built, the waters in our streams conserved with the assistance of Federal appropriations. What we need we will work for, earnestly and zealously, not only for *all* that conservation stands for on the mainland, but for the prosperity of our own fair islands.

We, the women of Hawaii, by throwing our influence into the organization, "The Woman's National Rivers and Harbors Congress," by agitating the subject among our people, by educating the children in the schools to a realization of what Conservation means, can be of great power in handing down to our children's children a land rich in beauty, in agriculture and in commerce. "For Hawaii," to quote Governor Frear, "small though she is, is soon to have the honor of playing a part out of all proportion to her size in the conservation of the natural resources of the nation."

The four men who are the recognized leaders in this great work are the President, Mr. James R. Garfield, Secretary of the Interior; Hon. Gifford Pinchot, head of the Forest Service, and Hon. F. H. Newell, head of the Reclamation Service; men of high ideals, who are working unselfishly under tremendous difficulties to put their ideals into practical execution for their country's good. In their zeal for their country, their comprehensive policy takes in these beautiful islands. As a tangible proof of the interest these leaders have in the part Hawaii is to take in the Woman's Conservation work, I take pleasure in reading their messages sent through me, to you, women of Hawaii. I am sure these letters will be an inspiration to you to respond most heartily in your desire to join in this great and ennobling cause for our good and for the lives of our children's children.

GOVERNOR FREAR'S ADDRESS.

Governor Frear began his address by expressing his interest in the fact that the women of Hawaii were about to take an active part in the important work of Conservation. After complimenting Mrs. Knudsen on her paper, Governor Frear said in part:

The present is an era of combination. This is shown by the number of societies and organizations that have been formed throughout the country, local, state, territorial, scientific, national, international. They are as numerous as the phases of human thought and action. Through them there has been an awakening of public sentiment. It is a significant and very hopeful sign that so many organizations in the United States have for their object the promotion of the material prosperity of the nation.

Of these movements perhaps the one with the widest scope is that for the conservation of the natural resources of the nation. The initial stage of this movement reached its culmination in the Conference of the Governors, held at the White House last May. Since then a new phase of the subject has developed; the period of education has given place to that of accomplishment.

Of the associations which have to do with practical phases of conservation none is more influential than the National Rivers and Harbors Congress. This association has for many years stood for the policy which is now represented by the Section of Waters in the National Conservation Commission, the successor of the Inland Waterways Commission. At the time of the meeting of the Rivers and Harbors Congress in Washington last December, there was organized the Woman's National Rivers and Harbors Congress to give the women of the United States an opportunity to help the men in this great work. Both organizations stand for a policy and not a project. There are many local associations looking to the improvement of the Missouri, the Mississippi and other rivers. The idea on which the National Rivers and Harbors Congresses is based is to have a comprehensive plan laid out by experts and then to work to have money appropriated for the carrying out of this plan as a whole in a regular and systematic manner.

Mrs. Knudsen was present in Washington at the opening of the Federal Congress, at a time when many national organizations hold their annual meetings there. It is an inspiration to meet the men with whom one comes in contact at these gatherings, and in the numerous social functions that accompany the regular meetings.

As Mrs. Knudsen has pointed out Hawaii is very deeply interested in the matter of harbors and the development of natural resources. I may say in passing that Hawaii played no insignificant part in the meetings held in Washington last December. Mr. Newell who, of course, was prominent, feels almost that he is one of us. Indeed, at one of the conferences he registered from Hawaii. In the Woman's National Rivers and Harbors Congress, I may safely say that Mrs. Knudsen, the representative from Hawaii, took a prominent and interest-

ing part. The mere fact that Hawaii was represented at all aroused interest and Mrs. Knudsen presented the interests of Hawaii in a very able manner.

In the comprehensive plan advocated by the National Conservation Commission and the Rivers and Harbors Congress, the idea is that the rivers shall be deepened and the harbors improved as a part of the great scheme of improving the navigation facilities of the nation. This involves the extension of American commerce as well as the development of the Inland Waterways. Hawaii is fortunate in being in a position to take advantage of this development. With the completion of the Panama Canal, the deepening of the Mississippi River, and the improvement of the harbors in the Gulf States, the Mississippi Valley will be brought into direct connection with the Orient.

Here in Hawaii we have no inland water ways to develop but we do need harbors. Already the harbors of Hawaii are being developed by Congress. The intention is to have at least one good harbor on each of the islands. When this is done Hawaii will be able to take advantage of the increasing commerce on this ocean.

While we have no rivers in Hawaii to develop for purposes of navigation the waters of our rivers have many other uses. Our main natural resource is the soil, the land, but to develop it properly water is needed. The rivers should be utilized in this way, to enable dry and arid lands to be reclaimed for, without water, many of our lands cannot be used for cultivation. The streams can also be used to develop power, but we cannot have the requisite supply of water without the forests are protected. Consequently in dealing with the subject of conservation we are not able to get far away from the forests.

In Hawaii the relation between the forests, streams and lands, are closer than in most other countries. The different forces work in such clear relation to each other that we can easily trace cause and effect. There has been much wastefulness in the handling of forests in Hawaii. Much of this has been unintentional and perhaps we do not realize to what extent it has been going on in the past. A few months ago I went over the Islands of the group with Hon. F. H. Newell, Director of the U. S. Reclamation Service, with the especial purpose of looking into the question of the reclamation of arid lands and of studying the local water supply. In traveling with him as I did, I saw more clearly than I had ever seen before the results of continued neglect and wastefulness in the use of the forests. Especially was this true of the Island of Kahoolawe which at one time was heavily forested. We were told that formerly this Island supported 15,000 sheep and 1000 cattle. During the last few months the sheep have died off in great numbers from starvation. Kahoolawe was

formerly covered with forest. Last fall we found a few Wili-wili trees and in one portion of the Island some Algerobas. For miles and miles the vegetation had been killed off and the soil simply blown away. In one portion there were little hillocks of soil 4-8 feet high above the hard-pan. Where the grass protected the soil these little hillocks were left; all the rest had blown away. Mr. Newell has traveled all over the Western States and has seen all kinds of arid land, but he said that he had never seen anything which could compare in desolation with the Island of Kahoolawe. This, of course, is an extreme condition, but it points to the necessity for wise and concerted action in handling the forests and lands on the other islands.

The time has come when there must be created a public sentiment that will not tolerate the wasteful use of our natural resources. It may be necessary even to interfere with private owners so far as to prevent waste which might not be restrained merely by private interest. Such waste often results in loss, the cost of which is borne by the community as a whole.

I am very glad to see that the women of Hawaii, as well as the women elsewhere are becoming interested in this subject. They have a very prominent part to play in the promotion of the general welfare and this can best be done through organization. I trust that the women of Hawaii will take a deep interest in furthering the cause of Conservation.

MR. HOSMER'S ADDRESS.

Mr. Ralph S. Hosmer, the Territorial Forester, and Chairman of the Territorial Conservation Commission of Hawaii, was the next speaker. Mr. Hosmer said in part:

Hawaii takes a very direct interest in the subject of Conservation. The whole economic fabric of this Territory depends on the right use of three of the great classes of the national resources, water, forests and lands. There are few places in the world where these sources of natural wealth are so interdependent as in these islands, or where the principles of Conservation can so readily be seen in operation.

Hawaii is essentially an agricultural country. From its situation and topography it follows that it must have a climate characterized by contrasts; one side of the island is moist, the other dry, even approaching aridity. But rich soil is often found in the dry districts, which with irrigation can be made highly productive. It follows that irrigation should be largely practiced. Over \$15,000,000.00 has been spent by private enterprise in developing water on the sugar plantations, but there

is much more land which should be reclaimed. Fortunately, on the windward slopes of the mountains are streams which can supply water for this purpose if they are properly handled. But the slopes are short and steep and the catchment areas small. It is necessary that the water sheds be protected by a cover of vegetation. The Hawaiian forest is the best possible cover for this purpose. But as the forest is easily injured it is necessary that it be carefully protected. For this reason forest reserves have been made and will continue to be set apart. There have now been created sixteen forest reserves with a total area of 444,116 acres. Eventually, about three-quarters of a million acres will be included within the reserve limits.

Wherever there is water to be protected this value of the Hawaiian forest takes precedence over all others, but in the leeward districts on the Island of Hawaii are areas where the question of stream production does not figure. Here the forests are of value because of the wood and timber that can be got from them and it is right and proper that they should be so used. But it should be clearly understood that the prime and essential value of the Hawaiian forest is because it protects the water sheds of the streams that can be used for irrigation.

The especial need now is for a careful study of the water resources of Hawaii, as a preliminary step to the extension to Hawaii of the benefits of the Reclamation Service. The Federal Government is willing to coöperate, but the initial move must be made by the Territory. For this reason it is particularly important that there be a strong public sentiment which shall make evident to the Legislature the necessity for an appropriation to get this work started. In no other way can Hawaii be so developed as through the intelligent application of the principles of Conservation.

THE HON. G. R. CARTER'S ADDRESS.

The Hon. G. R. Carter emphasized the importance of securing an appropriation for a hydrographic survey of the islands, and urged every lady present to do all she could, both collectively by petition and individually by the exercise of personal influence, to obtain a sum requisite for this purpose from the Legislature. A thorough survey of our waters lies at the basis of our local conservation policy and must be the first step to that end. Its importance cannot be exaggerated, for until it is made the islands are without an inventory of their potential resources. Until a hydrographic survey is made, who can say, with regard to our artesian system, whether we are living within our income or be-

yond it? If we are depleting our capital, disaster awaits us as surely as ruin follows extravagance in financial matters. Referring to the magnificent expanse of sugar cane westward of Honolulu Mr. Carter asked what guarantee those who derived their wealth therefrom possessed that the water supply upon which it depended was indefinitely assured. Through our lack of knowledge, we may not be availing ourselves of the full supply of artesian water which may with safety be drawn from our great subterranean reservoir, but on the other hand we may be over-drawing our account and in such a case it will some day be exhausted. Very few present would care to await the forty years which might be required to reestablish it. If the women of Hawaii would make a concerted effort in the manner suggested they would have begun in an eminently practical way and would achieve definite and tangible good.

REV. D. SCUDDER'S ADDRESS.

Some twenty-four years ago it was my privilege to visit Korea soon after it was opened to foreigners. The most impressive feature of the landscape in the journey from Chemulpo to Seoul was the utter nakedness of the country. No trees were to be seen until the capital was reached, the peasants having stripped every living thing even to the grass and weeds for fuel. Returning to Japan the happiest contrast met the eye. Here was a people taught through centuries so to love and conserve every natural resource that after more than a thousand years of cultivation the soil was as rich and productive as ever. Forest culture was well advanced and the affection of the people for trees was something beautiful. They were tended with care, cut under strict government supervision and entered into the life of the people as great and cherished friends.

The Japanese have learned the art of making trees do their will in blossoming and in bearing transportation for transplanting, at an age that would seem impossible to us. What is true of trees is equally true of ornamental shrubs and flowers, as well as of everything else useful that grows. This beautiful affection for growing things is fostered in the myriad homes of the nation and is intelligently directed in the government schools. But as there have been public schools only a comparatively short time in Japan the real cause of the love of all the people for nature and the consequent intelligence and care shown in husbanding natural resources must be sought in the family life. That which is learned from the cradle is never forgotten. It is therefore an omen of great moment for our Nation that our women are taking up this question of the conservation of our natural resources

with much enthusiasm. Women rule the home and preside over the early years of school life. If they take up this reform, it will go on to victory. It means everything for Hawaii that the College Club, uniting as it does so many of our cultured mothers, of our most competent teachers and of other leaders in every sphere of influence dominated by women, has committed itself heart and soul to this great national movement. There are no agitators in the world like women. The record of temperance education during the past twenty years is making this more evident as State after State downs the liquor traffic. By carrying the campaign into home life with its character forming conservation, by leavening social groups with the new spirit of conserving what God has given our Nation, by filling school children with right thinking on the subject, by multiplying just such delightful meetings as this of today, Honolulu's College Club is helping one of the most vital reforms in America speedily to triumph.

OTHER ADDRESSES.

Among other speakers Judge S. B. Dole, whose long residence in the Hawaiian Islands authorizes him to speak in no uncertain way on the subject, bore testimony to the detrimental influences which have been at work in the Territory to deplete its resources, although he appeared inclined to think that the injury wrought was not so widespread as was supposed. The Rev. H. B. Restarick also addressed the meeting.

The following letters, bearing upon the Conservation movement in Hawaii, were read by Mrs. Knudsen at the conclusion of her address:

LETTER FROM THE HON. GIFFORD PINCHOT.

United States Department of Agriculture, Forest Service,
Washington.

New York, December 26, 1908.

My Dear Mrs. Knudsen:—You have been kind enough to suggest that I might send through you to the women of the Hawaiian Islands a word about their share in the great movement for forest protection which is now sweeping over the whole country. I do so with the keenest pleasure, because the part of the women in this great movement has everywhere been not only an important one for the present, but the essential part when we come to consider the future. It is just as natural for the women to occupy themselves mainly with the condition of the Nation in the future, when the children of today will have taken charge of the National affairs, as it is almost inevitable that the men will give their principal atten-

tion to the questions and decisions which we must make now. These questions and decisions concern the future not less than the present, but after all those who control the children control the Nation of the future.

It has happened over and over again that the women have taken the leading part in establishing forestry in various parts of the United States. In Pennsylvania the whole movement began with the women; in Minnesota they took the leading part in establishing the Minnesota National Forest. And the growing interest in forest preservation on the part of the Federation of Women's Clubs, The National Mothers' Congress, and other great bodies of women, is one of the most hopeful things for all of us who are interested in securing for the future, so far as we can, some benefits from the forests which we enjoy today.

You in Hawaii have a peculiar interest in this question. Nowhere are forests and water supply more intimately connected than in the Islands, and very few communities have made such progress as yours toward practical forest preservation. There remains, of course, a very large work to be done. You are fortunate in having so good a man as Mr. Hosmer as your Forester to assist you in the work. More important still is your interest in public questions, which led you to send your representative, so admirably chosen, to the meeting of the Rivers and Harbors Congress and the Joint Conservation Conference. I welcome the opportunity for coöperation with you for the Forest Service, and I assure you that the service will always welcome the opportunity to do what it can to help along. One of the things I want most is a chance to visit the Islands.

Very sincerely yours,

GIFFORD PINCHOT,
Forester.

LETTER FROM THE HON. F. H. NEWELL.

Department of the Interior, United States Reclamation
Service, Washington, D. C.

January 3, 1909.

My Dear Mrs. Knudsen:—I wish to express my pleasure that it was possible for you to come to Washington from your far-distant home on Kauai to attend the conservation and other meetings held in Washington. The effect has been excellent in stimulating other women to take up the matter and in arousing a more general interest in the larger economic subjects.

together some of the active women of the Islands and continue the discussion of these matters and maintain a continuous interest in affairs of national importance. From your very distance you have a certain advantage in keeping alive the activities here!

Very truly yours,

F. H. NEWELL,
Director.

LETTER FROM HON. JAMES R. GARFIELD.

Secretary's Office, Department of the Interior, Washington,
D. C.

December 29, 1908.

To the Women of Hawaii:—Mrs. Knudsen, during her visit in this city at a time of several national congresses devoted to the conservation and development of the country's resources, has not only expressed the interest Hawaii has in this movement, but fully understands its spirit, and is now returning with an enthusiastic desire that Hawaii shall do its full share.

The women of Hawaii are among those who do things, and there is every reason why they should be deeply interested in a matter of such far-reaching importance as this to the national welfare.

Very sincerely yours,

JAMES RUDOLPH GARFIELD,
Secretary.

LETTER FROM THE PRESIDENT.

The White House, Washington.

December 19, 1908.

My Dear Mrs. Knudsen:—I am particularly glad that you came to Washington for the meeting of the National Rivers and Harbors Congress, and the joint conference of the conservation of our natural resources. Will you take with you, on your return, my best greetings to the women of the Hawaiian Islands, and my heartiest wishes for their success in the good work they are undertaking? I especially wish you and them success in fullest measure in your efforts for the

velopment of the Hawaiian Islands, and for conserving the water supply by protecting the forests. Your coming has brought the women of the Islands into closer contact with the women of the mainland, and that is one of its best results.

Sincerely yours,

THEODORE ROOSEVELT.

Mr. Augustus F. Knudsen,
Kekaha, Kauai,
Hawaiian Islands.

POTATO OPPORTUNITY.

In consequence of floods in the Sacramento valley, the garden crops of California have fallen greatly below the quantity necessary to meet the supply. The shortage of potatoes is particularly noticeable, only about 400,000 sacks being available for a demand of a million and a quarter. The prospect of advanced prices of potatoes in Hawaii should lead to extensive plantings throughout the islands. Our greatly enlarging white population will double the local demand for this necessary food, and with the coast supplies eliminated good prices for all that can be produced here are assured. The quantity of Hawaiian grown potatoes is very much below what it should be, and indeed, in many quarters the idea is prevalent that the islands are unqualified to their growth. The day when Hawaii supplied the Californian market with this crop need only be alluded to in order to remove this misunderstanding. Dwellers within reach of the Portuguese gardeners who have established themselves on the slopes of Punchbowl and Round Top, also can testify to the excellence of our local "Irish" potatoes. Indeed when one considers the universal use of this crop, the prevailing local prices, its ready growth in suitable localities, and the extreme delicacy of the fresh potato compared with the imported varieties, one is constrained to wonder why its cultivation is not only general among those who possess small vegetable plots, but also is not entered upon on a large scale to supply the local market.

The vigorous advertising campaign pursued in the interests of the Hawaiian pineapple, has already been productive of substantial response during the past month. Meanwhile the anticipated crop returns continue favorable and there is every promise of a very heavy production.

GOVERNOR FREAR'S MESSAGE TO THE LEGISLATURE OF HAWAII.

The following extracts from Governor Frear's message to the Legislature are of such interest to agriculture that they are published in full:

AGRICULTURE AND FORESTRY.

Much exceedingly valuable service has been performed by this board through its divisions of forestry, animal industry and entomology. The service can be greatly extended with profit provided funds are available, but unless some such arrangement, as is above suggested is made, it is not easy to see how this can be accomplished.

A serious question has been raised as to whether the president and executive officer of the board should not be salaried like the heads of other departments. There could be little doubt of the advisability of this if there were sufficient funds and if the department should be permitted to expand its work as it ought to. Under the circumstances, however, this would hardly be justified. The work at present is such that it may be performed by the head of one of the other departments, as, for instance, the public works, if it requires mainly an executive officer, or by the head of some other scientific institution, if it requires mainly a scientific director, notwithstanding that each of its three divisions is expected to be under a director of high scientific attainments. The leaning should be towards consolidation rather than multiplication of governmental agencies for purposes of economy and efficiency and unnecessary duplication of work. Besides the extensive experiment station of the sugar planters, there are the Territorial board of agriculture and forestry, the Federal experiment station and the college of agriculture and mechanic arts engaged to some extent in work of similar character. The Federal station is practically a territorial institution, though managed and supported mainly by the Federal Government. Eventually it not unlikely will be under territorial management. Sooner or later it may prove best to combine with it the board of agriculture and forestry. It may be advisable even now to have these institutions directed by the same person, if that can be arranged.

CONSERVATION AND DEVELOPMENT OF NATURAL RESOURCES.

Public thought has been awakened during the last year as never before to the scope and importance of this subject. There is no need of enlarging upon it here. It has many phases. Hawaii is scant in mineral resources and inland waterways. Her resources are mainly of the soil and the forest, the latter chiefly for the conservation of water for irrigation, power and domestic use. Trans-

portation facilities with other lands and harbor facilities naturally fall more peculiarly within the sphere of the Federal Government. There is within the Territory lack of railroad facilities, but perhaps the people are not prepared to encourage railroad building by subsidies or guaranty of interest on bonds. The construction of needed roads will be considered under the head of public lands. The principal remaining work in the conservation, development and better utilization of the natural resources within the available means would naturally in large measure take the following forms, to which portions of the fund above mentioned might be devoted.

SETTLEMENT OF LANDS, PUBLIC AND PRIVATE.

This should involve much more than has hitherto been deemed to be within the scope of the public land office. It should consist not merely in the surveying and the exchanging, selling and leasing of public lands and other incidental matters. It should include the study of large questions of immigration, industries, transportation, marketing, water supply and power, the best utilization of private as well as public lands, and the working out of schemes for execution by the Government or private owners singly or in coöperation.

HYDROGRAPHIC AND TOPOGRAPHIC SURVEYS.

A bill is pending in Congress for the extension of the reclamation service to Hawaii. A topographic and hydrographic survey is a preliminary to reclamation work and should be undertaken at the earliest possible date in order to advance the time when reclamation work may be begun. That work would mean the conversion of perhaps 100,000 acres of arid land into homesteads and is probably the only feasible method by which homesteading can be accomplished upon a large scale. Such surveys are urgently needed for other purposes also. An appropriation of at least \$5,000 a year should be made for this purpose in any event and authority should be given for its expenditure under the direction of the appropriate Federal officers, who will gladly coöperate not only in service but as far as possible with funds.

AGRICULTURE AND FORESTRY.

Scarcely any work for the benefit of the small farmer or the diversification of industries is of greater importance than that within the functions of the board of agriculture and forestry and the experiment station. Under existing conditions, the acquisition and application of scientific knowledge is essential to success. There is need of additional money not only for the extension and protection of forests, but for the promotion and protection of livestock and agricultural industries both large and small.

MARKETING FACILITIES.

There is a widespread belief that the Government should assist the small producer in overcoming one of his greatest difficulties, that of marketing his produce, a matter in which he is peculiarly at the mercy of others and in which there is need of coöperation, which without government assistance it is exceedingly difficult to effect. The work could be conducted without materially interfering with private business and in the end would doubtless prove of benefit to private business engaged in similar lines of work. The service could be kept in touch with transportation companies with a view to securing reasonable freight rates and making such rates and various accommodations an object to the companies by reason of increased production and shipments and care in packing. Marketing could be studied, buyers and sellers could be brought together, and information as to obtainable or desired products and facilities for transporting them could be furnished.

STATISTICIAN.

There should be systematic and continuous collection, classification and distribution of information bearing upon the foregoing and other subjects. There is an immense amount of information available already, but for the most part in scattered form, relating to all lines of governmental and private activity. This should be collected, added to, classified and made available for all needs.

SPECIFIC PROJECTS.

A portion of the fund may be expended for specific irrigation, road and other projects as well as for the foregoing and other general purposes.

COLLEGE OF HAWAII.

The establishment of this college was authorized by the last legislature. After much effort a ruling was obtained entitling Hawaii to share in the Federal appropriations for colleges of this character, and \$30,000 has been received for the last and \$35,000 for the present fiscal year. The amount will be increased \$5,000 each year until it reaches \$50,000 a year. The college has been established in temporary quarters and a large tract of land secured for permanent quarters. Additional adjoining land will be required, for which provision should be made by the legislature. A large and efficient faculty has been obtained and the college is in operation. Appropriations should be made out of loan fund for such permanent buildings upon the permanent site as are of immediate necessity.

The law establishing the college may well be amended in some particulars, as, for instance, by providing more definitely for a treasurer who has the handling of the large contributions made by the Federal Government. At the same time, the legislative assent to such contributions should be given, as required by the Federal statutes, which have been held by inference to have been complied with in this respect, but chances ought not to be taken on the possibility of a reversal of such ruling.

ALASKAN-YUKON-PACIFIC EXPOSITION.

This will open at Seattle on the first of next June. The National Government is providing the building and \$25,000 for Hawaii's exhibit, in contemplation that further provision will be made by the Territory or its people. Other contributions are expected from private sources, but additional funds are required and should be provided by the Territory. Hawaii has provided for exhibits at various general expositions in which she had comparatively little interest. The exposition in question is largely for her and she has a very special interest in it. The Northwest naturally should be one of her best markets, and this is a rare opportunity for her to advance her place materially in it. Moreover, she should meet part way the generosity of the National Government.

The Kona Tobacco Co. has recently decided to double its capitalization, which, under the new arrangement, will amount to \$50,000. The first crop of Kona tobacco, consisting of sixty bales, will probably be dispatched to the mainland this month. This is the first consignment of Hawaiian tobacco and as the quality is high, satisfactory prices may be expected. The enlarged capital of the company will permit of greatly extended acreage with a corresponding increase in output. Altogether the prospect for Hawaiian tobacco is distinctly good and we look to see tobacco record itself among the Hawaiian industries which have established themselves on a substantial basis in the shortest time.

The Bureau of Agriculture and Forestry is making a collection of Hawaiian woods to form part of the Hawaiian display at the Seattle exposition. The collection is intended to be as representative as possible, and nearly one hundred species will be shown. For this purpose Mr. J. F. Rock, Assistant Forester of the Bureau of Forestry, recently departed to Kauai to secure suitable logs from which to saw specimen blocks. The Kauai woods will be presented by Mr. A. F. Knudsen, who is chairman of the Hawaiian Commissioners to the Exposition.

CONSERVATION HEARING.

On Monday afternoon, March 1, 1909, the Senate and House of Representatives of Hawaii united in a joint session to listen to addresses on the subject of the Conservation of Natural Resources by the Governor of the Territory, members of the Territorial Conservation Commission, the Federal Judge and the Director of the Hawaii Experiment Station.

In his first message to the Legislature, Governor Frear made specific recommendations that provision be made for a Hydrographic Survey of these Islands, to be conducted by the U. S. Geological Survey, and that the work of the Territorial Forest Service be more adequately provided for.

The object of this meeting was to bring before the members of the Legislature a succinct statement of the aims and purposes of Conservation and the reasons why it is desirable that Hawaii should participate actively in Conservation work.

The meeting was arranged at the request of the Governor by the President of the Senate and the Speaker of the House of Representatives. Somewhat unusual in procedure, it is a recognition of the important place that Conservation holds in Hawaii.

The remarks of the several speakers, in full are as follows:*

House of Representatives,

March 1, 1909, 2:15 P. M.

Hon. R. W. Shingle (in the chair).

Ladies and Gentlemen: The House has invited Governor Frear together with several other gentlemen who attended the governors' conference in Washington held at the invitation of President Roosevelt in May last, at which was taken up the conservation of natural resources of the country; and the Senate is sitting in session with the House to hear these gentlemen in order that they may gain from their remarks certain knowledge which will guide them in the matters which may come before the present session of the legislature.

I will introduce Governor Frear, who will open the meeting with a few general remarks covering the situation.

* These addresses in English and in Hawaiian have been reprinted by the Board of Agriculture and Forestry for general distribution. Copies may be had on application to the Mailing Clerk, Board of Agriculture and Forestry, Box 331, Honolulu, Hawaii.

Mr. Walter F. Frear. Mr. Chairman, Senators, Representatives, Ladies and Gentlemen: The administration of President Roosevelt has been marked by an extraordinary series of not only remarkable events and achievements but also movements for reform and advancement, which could be effected only by a man of his courage and energy, breadth of vision and farsightedness. It is difficult to say which of these movements future historians will select as the most important, but a great many believe that it will be the movement for the conservation, the development and the better utilization of the natural resources of the country. The people are coming awakened as never before to the gravity of the situation, to the fact that the national prosperity is dependent upon the proper conservation and use of the natural resources. They are coming to realize as the result of recent investigation that the forests of the country will be exhausted in a single generation if the present wastefulness is not checked; they are coming to realize that there is very little public land left; they are coming to realize that in only a few years the iron and the coal mines will be exhausted. This movement for the conservation and development of our natural resources, while it has been preparing in one way or another for many years, has grown with wonderful rapidity in the last few years. It had its origin in many causes, but it came about principally through the feeling that the transportation facilities of the country were wholly inadequate. Organizations had been formed to promote the development of various water ways in the country for purposes of transportation, and about two years ago the President attended a meeting of one of these, and as a result of that meeting and the requests made to him, he appointed a commission known as the Inland Waterways Commission, consisting, I believe, of persons distinguished in their several lines of work, to investigate the subject of the inland waterways with a view to providing the necessary transportation facilities, which the railroads could not furnish. The farmers had not only to pay high prices for getting their products to market, but they often could not get them to market at all in many instances because there were not railroads enough. This commission was at work, but before it got very far, it found that the problem was larger than that of mere transportation facilities. It found that although there were 50,000 miles of inland water in the United States which were navigable or could be made navigable, that the United States was far behind European nations in the development of such water ways. It found that the water resources of the country had to be developed and utilized in a way to meet other needs than those of mere transportation, such as those of irrigation, generation of power, domestic and municipal use. They found that the public

lands were becoming very scarce and that in order to provide homes for settlers, expensive irrigation works would have to be constructed for developing the dry or arid lands. They found that the forests were being wasted so fast that it would be necessary to do something in order not only to supply the nation timber but to regulate the water supply. In those streams which were desired for purposes of navigation, at times there would be great floods doing great damage; at other times there was very little water. If the forests were depleted, this condition would become even worse, while if they were preserved and extended, there would be an even flow of water for purposes of navigation. And they found too that on account of the destruction of the forests, the soil was being washed away into the sea, the most fertile portions of the soil, thus destroying the land for purposes of production, and at the same time fouling the streams for purposes of domestic use. They found that the iron and the coal mines were becoming exhausted and that there was need of increased navigation by water so that the railroads would not have to draw upon those mines so much for furnishing transportation by land; they found also that both the national government and the state governments had to do with most of these matters and that they must coöperate in order to accomplish the best results. Accordingly, they advised the President to call a general meeting at which all the States as well as the nation should be represented, to consider the whole subject in all its phases. Such a meeting was called known as the Conference of Governors, which was held at the White House last May.

The President opened the meeting with a stirring address. There were present the Governors of nearly all of the States and Territories; also the members of the President's cabinet and the Supreme Court of the United States, and the Senators and Representatives of Congress. Each Governor brought three conferees. There were invited also representatives of about seventy of the great professional, scientific and industrial organizations of the nation, and other distinguished citizens, such as Mr. Bryan and Mr. Carnegie. For three days there were addresses by the most eminent men in the country upon all the different phases of this subject. It was a most impressive conference. One of its best results was the removal in large measure of the feeling, which had previously existed on the part of many, of jealousy against the encroachment of the national government upon the functions of the state governments. It was found that the national government on the one side and the state governments on the other each had their own peculiar functions, but that in order to accomplish the necessary results they had to coöperate, and that there was no desire on the part of either to encroach upon the functions of the other, except in so far as the other desired.

One of the recommendations of this conference was that the President should appoint a permanent national conservation commission, and that each of the governors should also appoint a conservation commission for local purposes, and for the purpose of coöperating with the conservation commissions of the other States and with the National Conservation Commission. At this conference my conferees were Mr. W. O. Smith, Mr. Hosmer and Mr. Gartley. After the conference I appointed as the conservation commission for Hawaii these three gentlemen and, in addition, Doctor Jared G. Smith and Mr. W. F. Dillingham. The President appointed a national commission of a large number of men, which has been subdivided into committees on the subjects of lands, waters, forests and minerals, and this national commission in coöperation with the state and territorial commissions has been at work since then making an inventory of the natural resources of the entire country, and making recommendations as to what should be done to prevent the waste of these resources and to facilitate their development. They reported in December at a joint conference of this commission and the governors. The meeting was opened by addresses by President Roosevelt and by President-elect Taft.

Since then another step has been taken. The President called another meeting, which has been held during the last month, of representatives of the great countries of the whole North American continent, the United States, Canada and Mexico. I believe he is now considering the calling of a still greater conference, a world or international conference, to be held in the near future at which shall be represented all civilized nations.

Now, I have given an outline of this movement. It is a movement that is growing; it is a movement that is already holding the attention of the people of the United States as scarcely anything else is. The magazines and the papers are full of it. It is something that we here in Hawaii may take home to ourselves. The problems here are just as serious, although on a smaller scale, as they are on the great mainland.

We have no mineral resources here to speak of, and so do not have to concern ourselves about those to any great extent. Fortunately our natural resources are of a better kind, for when mines are exhausted, as they will be sooner or later, they are gone forever; but other resources, such as those of the soil, the forests and the waters may be so used as to be developed and actually improved. Those are the kind that we fortunately possess.

We have no inland water ways to develop. We need not trouble ourselves about those, which present so important and difficult a problem on the mainland. Here there is a group of

islands. We have water ways already made for us. Our population is mostly along the shores and we can have water transportation by sea. We need harbors, however, but here again we need trouble ourselves but little, except to present our needs to Congress. Congress is developing our harbors for us at a rapid rate. The intention is to have at least one good harbor on each of the islands. Work is already well under way for Honolulu harbor and Hilo harbor. Congress is now appropriating for a harbor on the island of Maui and one on the island of Kauai, and it is planned in the near future to take action in regard to another harbor on the island of Hawaii, on the Kona side, and a harbor on the island of Molokai.

Our natural resources are chiefly those of the soil and of the forests and of the sea. The resources of the sea have so far received but little attention. We have a great variety of the finest quality of fish, but there are not enough of them. A bill is pending now in Congress for establishing a fish hatchery for Hawaii with a view to increasing the quantity of fish in the sea, to supply the wants of all. It may be that we shall need to do something in that respect ourselves. Congress in general believes in helping States and Territories that help themselves. It is now helping us in many ways. It is beginning to help us in the matter of forests which is one of our most important natural resources, not merely for the purpose of the timber, but mainly for the purpose of conserving the water, for purposes of irrigation and power and domestic use. We need to experiment with a view to obtaining new varieties of trees which will be good for timber and which will grow at our high elevations, particularly where now scarcely anything will grow. Mr. Hosmer probably will tell you more about this; but the Federal Government has just begun making contributions to the Territorial Government for this purpose.

Our main natural resource is the soil, the land. You know as well as I that we have very little public land and that very little of that is suitable for purposes of settlement. A great deal of it which is suitable can be opened for settlement only at great cost by the construction of roads. We shall have to construct roads ourselves and probably out of the proceeds of the sales of public lands which are opened for settlement. Provision is already on our statutes for that purpose and a bill is pending now in the legislature for increasing the means for constructing roads. But there are other ways in which we may obtain more land for the purposes of settlement. We have great stretches of arid land, the most valuable of all land provided we can get water on to it. We need to bring water on to this arid land and make it suitable for settlement purposes. There are perhaps 100,000 acres that can be brought under cultivation in this way. You know what the planters

have done. One-half of all the sugar land in the Territory has been reclaimed at great expense by irrigation works, and you know that is the most productive land. You know how much more productive taro land is, which is irrigated, than kula land, which is not irrigated. Now, if we can get the United States to extend its reclamation service to these islands, we can probably bring under cultivation 100,000 acres of land which is now practically useless. This land will go a good deal further than land which is not irrigated, because it will produce so much more that each person will not need so large a tract. It will also be much easier and less expensive to open it, because it is now comparatively free from rocks and from forest and it will be comparatively inexpensive to construct the roads. But it may be that, in order to bring this about, we shall have to do something in the way of a hydrographic or water survey, which is preliminary to reclamation work. It is the practice for the Federal Government to help the different States and Territories in the matter of a hydrographic survey when they also contribute to that work. It is comparatively inexpensive and if we can contribute something for that work we will probably receive help in that line from the Federal Government, and besides we shall receive benefits in many ways which will come from that. It will show us what water we have, where it is, how it can be got at and how it can be utilized for the various purposes for which it is needed.

This is not all. We need not only more land but we need to know what to do with the land, what kind of crops to raise on it, how to cultivate it, how to make the best use of it. Many people seem to think that almost any one can farm. But this is a day of scientific farming. It requires the scientist to ascertain what kind of crops can be raised, to analyze the soil, to experiment with crops from different parts of the world to find out where the best seed can be obtained and how it can be obtained, to instruct the people how to cultivate. Any one going about these islands can see how much need there is of scientific investigation and instruction.

We have but to look at the planters' experiment station to get a lesson in this respect. There is an experiment station, perhaps the finest private experiment station in the world, maintained at an expense of \$70,000 a year, but saving the planters or making for the planters probably several million dollars a year through their experiments and investigations which cover not only these subjects to which I have just referred, but the combatting of the insects and diseases and pests of one kind and another. We need something in that direction for the small producer. We want to enable him to profit by scientific investigation and instruction just as much as the sugar planters are profiting through their experiment

station and through lines of scientific work. A large industry can do things for itself, but many small industries find it hard to combine and act together. The government often must act for or with them. A great deal has been done, a great deal is being done in this respect through the Hawaii Experiment Station,—of which probably Doctor Wilcox will speak,—through the Bureau of Agriculture and Forestry and in other directions. The Federal Government is helping. It contributed \$30,000 last year and \$35,000 this year and will contribute \$5,000 additional each year until in a few years it will contribute \$50,000 a year for the College of Agriculture and Mechanic Arts. It is contributing for the Hawaii Experiment Station,—at first \$15,000 a year and gradually increasing it until it will soon be \$30,000 a year. It is helping now, as I have said, also in forestry work. It is helping in other lines of work, but it expects us to do our part. Hawaii has generally taken an advanced position, as, for instance, in health matters and in school matters and it has grown in political ways. It is taking hold of these scientific matters in connection with agriculture, but more should be done. As little as possible should be spent for the actual machinery of government, so that we may have more to put into these other things which will add to the material prosperity of the country. There is a great deal that can be done yet and at comparatively little expense. Probably an additional \$100,000 would result in the saving or the making of millions of dollars for the small producers in the very near future.

I have talked longer than I intended. I have talked in a general way. Those who follow me I hope will speak in more particular ways.

The Chairman (Mr. Shingle): Professor Ralph S. Hosmer, the Territorial Forester and also chairman of the Territorial Conservation Commission, will be the next speaker.

Mr. R. S. Hosmer. Mr. Chairman, Members of the Legislature of Hawaii, Ladies and Gentlemen: Governor Frear has said that the four main classes of natural resources are forests, lands, waters and minerals. The investigations of the National Conservation Commission during the past year have shown, as the Governor has also pointed out, that many of these resources are not inexhaustible as we have fancied in the past, but that the end of the resources of the United States is in sight unless steps are taken to adopt far sighted and comprehensive plans for their proper management and wise use. Therefore, conservation has become one of the paramount problems of the hour, one in which Hawaii has a peculiar interest. There are few places in the world where the principles of con-

ervation can be seen to be at work so readily as here in these islands. Let me recount briefly the reasons why this is so.

Hawaii is essentially a country dependent upon agriculture. Lying in the sub-tropics as this group does—mountainous islands in the trade wind belt—it follows that Hawaii has a climate characterized by extremes. In the windward districts is heavy rainfall; on the lee side of the mountains dryness, even approaching aridity. On each island it is the same: Hilo and Kau; Hana and Kula; Halelea and Waimea. But it does not follow that the rich land is necessarily in the moist districts. There is in the dry districts, even in the districts which approach aridity, much rich soil which with water can be made productive. Hence it follows that irrigation is a natural consequence in order to make some of the best lands in the dry districts productive. Without moisture these lands are of little value and so it follows that where water is not to be had naturally, it must be got artificially—which means irrigation.

The Governor has already pointed out how the large plantations at very considerable expense have brought out water from the windward side to irrigate their fields. Fortunately on the windward side of the Islands there are numerous streams, which, with the artesian water in other places, are sufficient to supply most of the needs for water if the forests and the streams are handled in a judicious manner. Because of the steep, short water sheds, it is essential that there be maintained a cover of vegetation on the catchment basins of the water sheds. Without such a cover of vegetation, the water quickly runs away, not only being lost to human use, but doing considerable damage through the erosion of the upper parts of the valleys and the flooding of valuable lands below. The Hawaiian forest is admirably adapted to act as a protective cover on the water sheds. When the water shed is covered with vegetation the dense tangle of trees, shrubs, vines, ferns and moss retards the runoff, prevents erosion and stores up the rainfall. The water is then gradually given out to feed the springs and streams, which results in a fairly constant flow. The native forest is the best possible cover for the water shed. Consequently, in view of the value of water to the Territory, the only wise course is to protect the forest cover on all the streams that are or may be needed for economic use. The preservation of the forest saves the waters. The assurance of a dependable supply makes possible the development of land that could not otherwise be turned to useful account. In Hawaii, lands, waters and forests are interdependent, so that a policy of conservation is essential.

The Hawaiian forest is easily damaged from fire, cattle and from other causes and it is essential in order to get the best

results that the forests be protected. That the forests may be better protected and more easily handled to the end that the waters they safeguard may be used in economic ways, forest reserves have been created and will continue to be set apart.

There have now been established sixteen forest reserves on the four main islands of the group with a total area of 444,116 acres. Of this 61% is government land. It is probable that the creation of forest reserves will go on until eventually about three-quarters of a million acres will be so included, and these forests should be maintained and kept intact so that the water from their streams may be turned constantly to human account.

At this point I may say that the relation of the forests to the streams is essentially the feature of Hawaiian forestry and that wherever there are streams, the forests should be protected. In some of the leeward districts, there are forests which may be treated from a commercial standpoint, because in those localities there are no running streams and only a few springs to be conserved. But far and away the most important use of the Hawaiian forest is that it protects the streams. Wherever there is a water which may be turned to account this is the chief value of the forest.

The Governor has also pointed out that there are other uses to which forests may be put: The waste land, especially at the high elevations on the greater mountains of the Territory can be made to grow trees which are not native to Hawaii, yielding valuable commercial timber, such as the timber which we have to import from the coast. The Federal Government, through the Forest Service, has this year given the sum of \$2,000.00 for experimental work in planting pines, spruces and firs at high elevations on Mauna Kea and Haleakala. Inclosures are now being made in which experimental lots of these trees will be set out. This is a step that should lead in time to the afforestation of those mountains.

The relation of forests, waters and lands is of peculiar importance and interest in Hawaii. These three natural resources are interdependent. The essential need at the present time is for the careful study and investigation of the local water problems by trained men—the experts of the United States Geological Survey at Washington—as a preliminary step to the extension to Hawaii of the Reclamation Service. The Federal Government is willing to coöperate with the States and especially with Hawaii, provided the initial move is made from this end through the appropriation of a comparatively small sum. The Federal Government will go more than half way, but the initial move must be made here. It is for this reason that it is so important that some action be taken by this legislature to get this work started, for there is no way in which

the Territory can be so developed as through the intelligent application of the principles of conservation.

The Chairman. The next speaker will be Doctor Jared G. Smith, who will talk on conservation as related to Kona forests, waters and lands.

Dr. Jared G. Smith. Mr. Chairman and Members of the Legislature, Ladies and Gentlemen:

The conservation of natural resources means the saving of money, the saving of property, that we, the people of Hawaii, own, for the benefit of our children and our children's children. The resources in the way of forests, of timber already existing on public lands and on lands in private ownership amounts to an enormous figure, provided you can translate standing timber into terms of merchantable timber.

As you know, I am living in Kona, and have been taking note of what we have in Kona, both in the way of standing forests and of water. A stretch of virgin forests, untouched by the hand of man, extends from Kahuku, or from near Kahuku, to the slopes of Hualalai, a forest some fifty miles long and at its widest point considerably over five miles in breadth. The standing timber on this land, magnificent trees of large diameter, containing a good many hundred feet, or in some cases nearly a thousand feet of merchantable timber, approximately estimated, amounts to about 150,000,000 feet, board measure. So you can see that the Territory and the people actually own a great deal of property which unless they take very good care of it may be destroyed. I have seen, and you have all seen, much forest land destroyed by fire. There must be protection of this money, of this property, that belongs to the people of the islands—it not only belongs to us but belongs to those who come after us. There must be action taken to protect it from destruction. Much of this forest is on land privately owned, but a very considerable amount of forest of high money value as property exists on government lands and belongs or should belong to the people of the Territory and should in course of years to come provide a great deal of revenue for the support of the government.

Besides preserving the forest because of its actual money value as property, there are other good reasons why we should preserve our forests. The chief one of these is that of conserving the moisture, preventing the too rapid run-off of water. I have made a hurried calculation of the rainfall of that forest belt, which I know or which I know in part, that in the Kona district on the Island of Hawaii. Taking a rainfall—an estimated rainfall—not an unreasonable one—say 100 inches a year (there have been private records taken some time back, some 10 or 12 years ago, showing that the average rainfall at about

the lower edge of the forest is considerably more than that)—but taking the rainfall of that Kona forest as being 100 inches a year, we will say that there are 200 or perhaps 250 square miles of forest, and 100 inches of rain per acre amounts to something over 2,000,000 gallons of water. The rainfall, the actual amount of water that falls on a square mile of land at the rate of 100 inches a year amounts to 16,000,000 gallons of water for every inch, I believe. The actual amount of water that falls in that Kona forest—and that forest is on the dry side of the island—amounts in the course of a year to 400,000 billion gallons of water, an amount that is absolutely beyond comprehension. And yet no effort has been made to conserve that water. We have just had a drought affecting the whole dry side of the Island of Hawaii. We had to buy water, but during years past and for all time there has been this enormous quantity of water that could have been, much of it, conserved for the benefit of agriculture, not only in the Kona district but elsewhere on the island. Not 1 per cent., I think not one-tenth of 1 per cent., of the water supplied by the rainfall is now preserved for use by the plantations or by the farmers. It is a money proposition; it is a business proposition.

In New England they have found that it pays to buy land and plant it in forest, plant it in varieties of trees which will not yield merchantable timber for fifty years to come, and yet such plantings, some of them, have already yielded an income of $2\frac{1}{2}$ per cent. per annum for the entire term. The government can do that kind of work and should do it. Much of this property belongs to the government, belongs to the people. It is proper, it is right, it is good business; in fact, it would not be good business not to do it, to begin to take care of some of the property belonging to the people. There is water and abundance of it to spare. There is timber to last for many years, that which is not standing, merchantable timber. Just one day last week I was up in the forest. I saw great koa trees six feet in diameter, thirty and forty feet high, nothing being done to protect them, because there was no money to pay for the protection of this valuable property.

Without the forest to retard the run-off, there follows flood and destruction. We have all of us seen the ocean reddened for miles from the land with the surface soils from our cultivated fields. We have seen fields, the entire surface, swept into the ocean. This loss is not simply a loss to the individual plantation or the individual farmer affected, but it is a loss to the Territory—it is taking away from the natural resources of the Territory some of its capital. Besides the actual conservation of water, in order that we may use it, besides the actual preservation of forest in order that we may use it,

sides, well, besides both these, we must conserve both the forest and the water in order to save our soils. Water is necessary for the growth of plants, it is necessary for our domestic stock. If any one of us discovers that he has a hole in his money pocket, he mends it; it seems to me that the Territory has a hole in its money pocket, and the Legislature should see that there is a hole there and try and stop it, in order that loss of actual property resources shall no longer continue.

Senator Fairchild. May I ask a question in regard to one matter? That is in regard to the Kona district. There has been a bill introduced in the Senate by Senator Baker, I believe. I want to ask if that is the same district which this bill will cover.

Senator Smith. Yes, it does; Kona and Puna—the same district.

The Chairman. I think it does. The Forest Committee of the House was very much pleased when Judge Dole consented to address you. I am going to call on the Judge now. He will address you on forests as affecting rainfall.

Judge Sanford B. Dole. Mr. Chairman, Ladies and Gentlemen:

Mr. Hosmer has, I think, sufficiently dealt with the subject of forests as affecting conservation of water for irrigation purposes and for purposes of power. Mr. Jared G. Smith has carried on the discussion of that proposition a little further and brought up the matter of conservation for the collection of water in districts where there are no streams for the purposes of irrigation and domestic use. Hawaii is a large island with a pretty dry interior, and between this large interior and the outside slopes of the island are large and extensive forests. Hawaii has never been explored thoroughly, but it is being explored at the present time in regard to its forest assets from a commercial standpoint. Those of us who have grown up on these islands and have seen the clouds pass wooded ridges and over the dry slopes beyond have noticed how the clouds disappear, lessen, and finally are gone, and how in some parts of the islands, as in Haiku on Maui, rains will exist all day over the forest in that region, the trade winds carrying the clouds along past the forest, over the dryer lands where the different plantations are cultivating cane by irrigation, and how these showers gradually disappear as the forest areas are left behind—we cannot help believing that forests have an effect on rainfall, in these islands at least. The operation is observable to the eye, and the effect of forests in that relation is not limited to the actual area of the forests. It is, I

believe, ascertained that the air from forests is cooler than the air from lands devoid of vegetation, and this is one reason why clouds appear above forests and not over surrounding regions that are devoid of vegetation and where the air above them is saturated, is full of moisture; the cooling air is more likely to produce showers than the air from other regions which are bare of vegetation. It may be said perhaps more correctly, not that forests create showers or produce them, but rather that they allow the showers to come down. They remove the obstacles. The islands, as has been said, have all the problems of conservation except those that relate to mines. And it is probable that we have suffered almost as much as the United States in the loss of forests, for since the time that cattle were introduced in these islands by Vancouver and have increased, forest destruction has gone on mainly through their ravages, which has destroyed the undergrowth, thus causing the forest to recede. It is in the memory of not very old people how the forests between here and Waialua came nearly down to the road, how the large forests on Mauna Haleakala came nearly down to the mission, and that all over the islands recession of forests has been very noticeable. And the forests that are left are the merely commercial assets or are something to be preserved permanently for the protection of the agricultural and domestic interests of these islands. I was just talking with Mr. Herbert as I came in. Mr. Herbert is very strong against destroying forests for any purpose. He believes that it is a mistake. I am under the impression that forests to be taken care of according to the most modern scientific methods must be taken care of with a view of receiving some revenue from them. The government gets tired of giving out money perpetually to protect a forest. If the forest can only pay its own expenses, or yield some revenue, the probability of its being taken care of is much better. The proposition is up to the government now in regard to the forests of Kona and Kau. Enterprising companies are asking the government to allow them to cut down some of these big old forests that were hardly known to exist a few years ago, and the government don't know exactly what to do. If forests have no affect on the rainfall, they might just as well cut those forests down and sell the lumber and make what they can out of them; but if the forests do affect the rainfall, as I believe they do, then it is up to the government to see that those forests are maintained. The lumber may be cut down and sold, but it is up to the government to see that those forests are maintained and that new trees are allowed to grow and be cultivated and protected from cattle. Now, the reason of this is mainly for the small landholder, I think. Kona, North Kona, has the beginnings of a sugar plantation, but there are great areas of land there that are populated by Hawaiians

nainly, the best community of the native Hawaiian that is to be found on these islands, having large families, people who are healthy as a rule. I say that the question of the protection of rainfall is something to be considered in view of the interests of those people, the small landholders; that if possible the droughts which sometimes occur and drive them away from their homes, which make water an article to be supplied by the quart for drinking purposes and sometimes not obtainable even then, should be lessened—that the conservation of forests there in that region reaching from North to South Kona, Kau and in the Puna district, is something to be considered from the standpoint of the small landowner. The same condition exists in Kula on Maui. It was a terrible hardship to those people last year to have to leave their homes because they had no water and had to drive their livestock miles away every other day to get water to keep them alive. In Kau the ground was strewn with cattle which had starved to death for want of grass and water. For the protection of the graziers this policy of conservation must be considered. And with it goes the preparation of reservoirs for retaining large quantities of water. I am afraid that the progress of the conservation of water in dry regions like Kona and Kau will be slow. There are no streams there. The soil is very porous. It takes a very heavy rainfall to send a stream down the slope into the sea, and the conservation of water in those places will mean much outlay of money in order to make a reservoir. To make it water tight the whole area of the reservoir will have to be cemented. The expense is great, and in view of the expense and the time which will be taken up before such kinds of conservation can benefit that community—the small landholders—I think it is most important for the government to consider the relation of forests in that part of the country to the rainfall. I need not refer to the prosperous island of Kauai, an island of wonderful streams, but of neglected forests, however, in parts of it, forests diminishing steadily, but which can be easily protected and restored with a little expenditure of money and intelligent care.

The Chairman. On the opening day of the session there was introduced in the Lower House a resolution by the Honorable Mr. Affonso of Hilo, which provided that the Governor appoint, as soon as may be after the adoption of the resolution, a commission of three to look into the question of farm products and the marketing of the same, both between the islands and on the mainland. That resolution was adopted by the House and adopted by the Senate, and was signed by the Governor a day or two ago. There was later introduced a bill by the Honorable Mr. Furtado which called for an appropriation—a subsidy—of \$50,000 a year to a steamship line

which would give better trading facilities between here and the mainland for farm products, etc., that grow on these islands. The Committee on Forestry, Agriculture, Promotion and Immigration of this House saw fit to table or recommend that the bill be tabled, and that the clerk be instructed to send a copy of this bill to the commission to be appointed by the Governor. The House of Representatives saw fit to adopt the committee's report, and it looks as though this commission, which the Governor in due time will appoint, will have something to do. Prior to the appointment of the commission, however, I am going to call on Dr. Wilcox to address us, and he will speak on the products and marketing of farm crops.

Dr. E. V. Wilcox. Mr. Chairman, Ladies and Gentlemen:

In the few minutes that I have I want to call attention to a very few specific matters regarding the possibility of the marketing of a whole lot of things which we now produce more or less for which we seem to have no market. Whether or not that is the logical way to discuss the matter, however, I wish to speak of marketing first because I think you will all realize and agree with me that there is very little use in producing large quantities of crops which now do not appear on the market.

It has been frequently brought to my attention that there is no money to be made in the marketing of certain things, but I wish to call to your attention that continually inquiries are being made at the Experiment Station from men on the mainland, and even from people here in Honolulu, regarding the possibility of securing more of certain things raised here. I have had considerable correspondence recently with a merchant on the mainland, for example, who wished to get ten tons of dry roselle, for which he is willing to pay eighteen cents a pound here in Honolulu. Much difficulty has been met with in learning whether the cultivation of roselle could be increased sufficiently to supply the quantity required by this one merchant. The party in question would be glad also to get the article in three or four times the quantity mentioned. Inquiries have also been received for the names of parties who deal in taro products in order to introduce these products to mainland markets. The two matters mentioned are sufficient to show that there is a demand on the mainland for some of our products. The two matters mentioned above happen to be the only ones which have come to my attention.

The success attained by the sugar planters of the islands is due as much to their organized and systematic efforts in securing and exploiting the market for sugar as to their actual production of it. In order to secure markets for any product it is necessary to organize in a systematic way and make

own to the public what you have to sell. Now, there is one way by private effort of securing markets for produce, and that is by means of coöperative organizations of producers, which have been formed in nearly all parts of the mainland and in various foreign countries. The chief difficulty with such an organization is getting it established in a community which is unfamiliar with that method. One of the first difficulties lies in the mutual jealousies between men who are producing any given crop. This leads to a lack of confidence in the men who are chosen as officials of the organization and in the efficiency of any constitution which might be adopted for regulating the business of the organization. It should be a very simple problem to adopt rules which will put everyone on the same footing. In the absence of definite plans for a coöperative organization among producers of various small crops, it seems desirable that the Territory should render assistance in establishing an effective system of marketing. It is hoped that Territorial assistance will be necessary only so long as it must be required to set the scheme in operation. In the meantime the proper men will doubtless appear to take over the management of the business and organize it as a coöperative association of producers. They ought then to get along without further Territorial assistance. In these days of large corporations, agriculture is not exempt to the general rule; the small producer with a small quantity of produce brought to market at irregular intervals cannot satisfy the demands of the dealer, nor secure any business concessions from transportation agents. The only way to avoid the inconveniences met with by the small producer is to organize so that the products of the organization as a whole total in time a large amount. Transportation companies can then look upon the freight proposition in the same way they consider the freight business of large corporations.

In encouraging diversified agriculture the first step necessary would seem to be that of learning the names of dealers who wish to handle agricultural products, and the quantities and kinds of such products which they can handle. It would also be necessary to get a list of the producers who are raising such material and who can reasonably be depended upon to furnish it. It will undoubtedly be necessary in the adoption of such a scheme to have a sort of commission house or landing place where such articles can be received and from which they can be distributed to those who need them. In this way it is hoped that enough producers can be found to send their products to this common center, and thus to have a constant supply of products which will satisfy local demands. Not only will this marketing organization have the effect of bringing in a constant supply, but opportunity will be had to keep the producer informed as to the kinds of farm products

which are actually needed and as to the best methods of packing and shipping this material.

There is at present a local demand for sweet potatoes far in excess of the supply. The local demand is not only for a large quantity, but for a more uniform article, so that the consumer will be able to call for a definite variety and will be assured that he will obtain what he desires. The local sweet potato market could be greatly extended by the development of those varieties which are most in demand. Now, if there is one lesson which California, for example, has taught the world, it is the lesson that it pays to give attention to the product before you send it to market. The very fact that California has sent oranges three thousand miles across the country and put them into the market in competition with local products proves the value of careful methods of marketing.

We come now to the question of scientific problems connected with crop production. At present the Hawaii Experiment Station has its work organized around one chief problem, namely, that of preserving soil fertility indefinitely. It is to be accomplished by determining the best system of crop rotation and treatment of soil by fertilizers, so that to make the operation of farm management fit in with the plan of raising one particular crop as the money crop. The present plan involves the demonstration of best methods to accomplish these results with pineapple, cotton, rubber, taro and in the production of forage and rice. The plan of farm management, in order to be scientifically correct and successful from a business standpoint, must be such that the yield of the money crop will be maintained at the highest point rather than diminished as each rotation comes around. Some of the crops which must be used in rotation with the chief money crop can thus be sold, while others will be used as forage for farm animals and for benefiting the physical and chemical condition of the soil. The need of such rotation has been felt most keenly by the pineapple growers, but it is necessary with every crop. It is impossible to secure maximum yields of pineapples when this crop is grown continuously on the same soil. The interruption of continuous pineapple plantings with other crops will not only produce the profits but will permanently maintain the fertility of the soil.

The necessity for the production of more forage on ranches is evident from the great loss of cattle which was suffered during the present season of drought. There is no possible way of increasing the carrying powers of the grazing land and putting the business of ranching on a solid foundation except to produce enough forage to tide over the animals during the period of drought and thus relieve the overstocked ranches.

The Chairman. The chairman has been informed that he was in error when he stated that Honorable G. F. Affonso introduced the joint resolution referred to. The resolution was introduced by Honorable A. D. Castro. The chairman finds that its list of speakers has been materially diminished. We have one other gentleman, the Honorable W. O. Smith, President of the Senate, however, whom I will now call on for a few remarks.

Senator W. O. Smith. Mr. Chairman, Ladies and Gentlemen:

The hour is late and there is little I wish to say except that I wish to add to what Governor Frear has said in regard to the impressiveness of the meetings of the Conference of Governors in May last. During those three days not only were the Governors, the President and many of the high officials of the great country brought and gathered together there, but in addition there were also many of those great master minds, the captains of industry, who came and gave the most intense attention to the subject of the conservation of the natural resources. It was a matter of pride to me that what little we had to say of Hawaii was so much to the credit of Hawaii. We had very little opportunity to speak in public. But what has been done in Hawaii for the utilization of water is a matter which is a cause for pride, as is also the matter of our forest reserves. Many of the States did not even have forest laws, but over one-tenth of the whole area of these islands is now under forest reserves. There is a little less than four million two hundred thousand acres of land in the whole of the islands of the group. One-tenth is under forest reservation, and with

provision that they should be free from taxes. Much has been done, but we have much more to do. I think that together with the matter of conserving and saving the forests, here is the question of development of the products along the lines of the work that Dr. Jared G. Smith is doing in Kona. The experiments being made in tobacco culture is one of the hopeful things for the future. And at no time since the experiments, way back in the fifties, on Kauai, has there been

much to be hoped for from the cultivation of marketable tobacco which is now being done at Kona by Dr. Smith, and those associated with him. We must have products beside sugar. While we also have the small farming, the truck-farming and all that, we do want to have other products which the world's markets call for. For illustration, take Sumatra, Ceylon, Java, Cuba, the Philippines, and Porto Rico. What do they grow? In the Philippines, sugar, tobacco, hemp. In Java the main industry is sugar, and they are to have other products, and so we find it in Cuba. Now the time may come when we shall need another crop besides sugar.

Our salvation is to have other things than sugar, and I hail with great pleasure and with great anticipation the experiments that are being made in such directions, and I think that some of the help that we in the Legislature can give, as far as we are able to with the means that can be spared, is to assist the Federal Experiment Station, and to assist in the matter of a hydrographic survey—that is, the water survey; and the soil survey, and the experiments with products which will have world's markets, products which a man with but a few acres and small capital can engage in. The most independent man in this world is the man that owns his own land and makes his living on it. He is a king. He is a sovereign. A man whose living depends upon a salary or wages is some one's servant; but the man who owns his own few acres and is able to produce enough to support himself and his family is a king, he is a sovereign, he can defy anybody as long as he pays his taxes and has no debts. It is a thing that we must work for in this Territory more and more. There is no use in bringing small farmers here unless there is something that they can produce at a profit; unless there is something that a man with a few acres of land and small means can make a living on, and so I hail the work which men like Dr. Smith and Dr. Wilcox are doing.

The Chairman. This concludes the speaking. The Senate and House desire to extend thanks to the Governor and the other gentlemen for their remarks.

THE PHILIPPINE JOURNAL OF SCIENCE.

The HAWAIIAN FORESTER is in regular receipt of Part C of the Philippine Journal of Science, published by the Bureau of Science of the Government of the Philippine Islands, and which is devoted to the botany of the region represented. The December number of Volume III is just to hand and contains a number of valuable articles. New Genera and Species of Bornean Ferns, by E. B. Copeland, is supplemented by excellent illustrations of several interesting specimens. The paper on the Philippine species of *Garcinia* is of interest as it should help in the proper identification of some of garden species—the determination of which is often obscure.

The Director of the Bureau of Agriculture, Manila, announces the publication of a new monthly journal, "The Philippine Agricultural Review," which will be illustrated, and published in two editions, English and Spanish. The new journal will be a popular serial on general agricultural and will contain reports on agricultural conditions in different parts of the Philippine Islands, articles on tropical agriculture, and other material of interest to field industries.

THE BANYAN AND SOME OTHER CLOSELY ALLIED SPECIES.

One of Hawaii's most interesting groups of ornamental trees belongs to the great genus *Ficus*. All of the different species that have been introduced seem to thrive in our soil and climate. Although we probably have less than a dozen distinct species of *Ficus* there are said to be over six hundred, including trees, shrubs and climbers scattered throughout the warm regions of the world. Some of them are among the tallest and most magnificent trees of the tropics. Dr. Hillebrand states in his Flora that there seems to be no indigenous members of the *Ficus* in Hawaii, but that several species of banyan, the fig and the India rubber tree were introduced among the early importations of plants.

The banyan, *Ficus Benghalensis*, is probably the most interesting of all our trees to travelers. This tree, with its great expanded top, numerous trunks, each having been an aërial root, penetrating the ground from some outstretched branch, reaches a height of from 30 to 70 feet. By means of these aërial roots the new trunks gradually take the places of the older ones like so many generations supporting the massive top through countless ages. In African forests this tree often oversteps and outlives the other trees which may be seen in every stage of decay gradually disappearing and leaving the giant banyan the undisputed possessor of the situation. A single banyan will produce a great forest in which it is impossible to determine the original trunk.

A specimen of this tree in the Botanical Gardens at Calcutta sprang from a little seed probably dropped by a passing bird into the crown of a date palm more than a century ago.

The main trunk is now about fifty feet in circumference, with 232 additional trunks, and the great top extends over an area 850 feet in circumference, forming a dense evergreen canopy through which sunlight never penetrates.

The famous banyan under which Alexander's army of 7,000 men camped, now measures 2,000 feet in circumference and has 3,000 trunks.

The banyans in Hawaii are subject to the attacks of the mealy bug in dry weather, which causes them to look badly and appear somewhat deciduous.

Ficus retusa?, sometimes known as the Chinese banyan, is also an interesting ornamental shade tree. It is often confused with the true banyan but can easily be distinguished from *Ficus Benghalensis*, as it does not develop additional trunks through the aërial roots extending downward from the branches; the leaves are also much smaller, very shiny and leathery in texture. Fine specimens may be seen at Thomas Square, Lunalilo Home and one or two of the most mag-

“MANY TRUNKS, FICUS HENQUIA L. ENNIS.

THE BANYAN AS A VALUABLE SHADE TREE IN THE PARK.

THE CHINESE BANYAN USED AS AN ORNAMENT ON THE LAWN.

A BRANCH OF *FICUS RETUSA*.

are in private grounds on School street, near Nuuanu

ma Square there is an excellent India rubber tree, *Elastica*, which shows its relation to the banyan in the presence of a few aërial roots that dangle from its lofty branches, as well as in its peculiar little fig-like fruits.

Elastica is the well known India rubber tree of common origin indigenous to the damp forests of tropical Asia where it reaches 100 feet in height. This tree was for a long time the principal source of rubber and takes its specific name from the elastic nature of the sap after it has been exposed to the air. Of this species there are several variegated forms, one with leaves spotted with white and a rare form in which the leaves are edged with gilt, forming narrow bands about an inch in width, along the margins, giving a contrastingly beautiful effect with the glossy green centers of the leaves.

Though rubber plants are not uncommon about the homes in Honolulu, they are not as numerous as in most homes in our cities where it is by many considered the most ornamental and satisfactory house plant that has ever been cultivated. This is probably due to its easy culture, hardiness and dense foliage. It is estimated that over 80,000 rubber plants are sold annually in the United States for ornamental purposes.

In recent years, the demand for rubber has become so great that it has been found more profitable to obtain the article from other plants that are of more rapid growth.

Parcelli is probably the most beautiful of the banyan's relatives for the ornamentation of small home grounds. There are several beautiful specimens of this tree in our city. They grow to a height of about 30 feet having spreading tops, drooping branches and a dense foliage of thin, light green leaves mottled with irregular blotches of dark green and very white. During our winter months these trees bear a succession of beautiful tri-colored fruits, each about an inch and a half in diameter. These add greatly to the beauty of

our beautiful trees can probably be traced to their original introduction by James Veitch, a nurseryman of Chelsea, England, who introduced the original stock into Europe along with many other plants from the New Hebrides and Fiji Islands about 1874. *Ficus Parcelli* has been cultivated in Florida, Southern California and is occasionally found in greenhouses about New York City and Philadelphia. It is propagated by cuttings of half ripened wood placed in boxes of about three inches in depth and kept quite moist. Since this species has been in Honolulu since 1883 and is in common culture, few of our citizens have used this excellent plant for ornamenting their home grounds.

WILLIS T. POPE.

On Monday evening, March 8, 1909, the Committee on Agriculture and Forestry, Promotion and Immigration, of the House of Representatives, (Mr. R. W. Shingle, Chairman), held a public hearing for the purpose of obtaining an expression of opinion on the proposed enactment of a revenue measure to create a special fund for assisting Immigration and for local work in the conservation of the natural resources of the Territory. Among the speakers was Mr. E. D. Tenney, Vice-President and Manager of the firm of Castle & Cooke. Mr. Tenney presented certain figures in regard to the water resources of the Island of Oahu, which are of general interest. The section of his speech dealing with this phase of the subject is, in full, as follows:

"I would like to address a few remarks on the conservation of our natural resources, particularly as they relate to forests, and their relation upon the water supply. My own knowledge as to the condition of the forests and water supply on the other islands is limited, but I know something about it on this island; and within the last day or so, since receiving your invitation to attend this meeting, I have gone into this question of water supply in its relation to the sugar plantations of the island particularly, and I must say that I am appalled at the result.

"The Island of Oahu contains 600 square miles, 384,000 acres. The area of cane land under cultivation on this island was 37,500 acres. The daily pumping capacity of the pumping stations of the plantations on this island drawing their supplies from artesian wells, is 351,250,000 gallons. The daily pumping capacity of the Honolulu Water Works, for instance, is 11,250,000 gallons. The combined daily pumping capacity of the Hawaiian Electric, Rapid Transit, Honolulu Brewery, Young Hotel, Honolulu Iron Works, Oahu Railway and Land Company, and the Pacific Fertilizer and Guano Works, I understand, amounts to 4,000,000 gallons; while rice plantations and dairies, individuals, etc., have a daily pumping capacity of about 50,000,000 gallons more; hence the plantations, the Honolulu Water Works, the various companies I have referred to and the rice plantations, dairies and individuals altogether have a daily pumping capacity of about 416,500,000 gallons.

"From the best information I was able to obtain from Mr. McCandless and several other people around the island, it is considered an ultra-conservative estimate that the water used by rice plantations, dairies, individuals and other small agricultural industries from artesian wells amounts to 50,000,000 gallons a day, as above set forth. This reaches a total draft on the artesian system of this island of 416,500,000 gallons. This is equivalent to a yearly supply of 152,022,500,000 gallons, or we will say in round numbers 150,000,000,000, equivalent to 20,000,000,000 cubic

feet of water, or in acre feet, that is, acres of land covered one foot deep in water, of 459,137 acres. This quantity of water is equivalent to 1.2 feet in depth of water distributed over every square foot of land on this island. To deliver the 416,500,000 gallons used daily from the artesian system of these islands would require a ditch 40 feet wide and 5 feet deep, flowing at a speed of 180 feet per minute. That is quite a good sized river. The yearly supply would fill a lake 3 miles wide, 20 miles long and 10 feet deep. Quite a nice little pond of water.

"The rainfall in Honolulu for the past 24 years, 1885 to 1908 inclusive, averages 29.28 inches per annum. Now, the question is where does the artesian water supply come from. Here they are drawing equivalent of one-half of the average rainfall in Honolulu. From the best information that we can get the artesian system is replenished by the rainfall on the higher levels of the island, in the forest we will say, where it is retained; but a good percentage percolates through and finally reaches its way into the artesian system. The probabilities are that the area wherein this percolation takes place, where the water reaches the artesian system, does not exceed if it equals 150 square miles on this island. That means, if it equals 150 square miles, that 5 feet depth of water must percolate through that entire area to reach our artesian water system in order to replenish the draft made yearly.

"This is an illustration of the necessity of conserving the forest areas on this island to conserve the water supply and protect this artesian system, for if it fails, what would happen? These plantations raise their sugar by artesian water. If that artesian system failed, they would fail. That would mean a curtailment of revenue for the Government as well as revenue for all of the shareholders and loss of their investment.

"The taxes paid by the sugar plantations on the Island of Oahu for 1908 amounted to \$245,192.80. What taxes were directly paid by those of their employees upon their properties and incomes and personal taxes, I am not prepared to say, but I don't imagine I would be far wrong if I should say that it will easily reach another \$50,000 or \$75,000.

"I call to mind an incident of the effect of forests upon rainfall that touched the interests of my wife's family very materially. As many of you know, her father, Captain Makee, owned the Rose Ranch, what is known as Ulupalakua, now a cattle ranch on the Island of Maui. When I arrived in the Hawaiian Islands, that was considered a flourishing sugar plantation, one of the most flourishing sugar plantations in the country. It was exceedingly profitable. It was then suffering from a drought. The Island of Kahoolawe at the time that plantation was started was covered,—the top of the island was covered with a dense forest. As the trade winds brought down their clouds laden with moisture, they would commence to gather over the Island of Kahoolawe in the early morning, and the area of this cloud rack would

increase back gradually across the channel over the lands of Ulupalakua and every afternoon almost without exception a fine rain fell upon that place. With the leasing of the Island of Kahoolawe for a sheep pasture and without taking any precautions to protect the forests, they gradually encroached upon it, until the forest was all killed. With the elimination of the forests on Kahoolawe, this gathering of the clouds over the island and their backing up across the channel and over that portion of the Island of Maui ceased and no rain fell at Ulupalakua for three and a half years, with a result that that place was dried up and of course abandoned. I am informed by people who have visited the Island of Kahoolawe within the last few years that the remains of that forest are there in evidence. Many of you who have traveled down from Hawaii through those channels with a strong trade wind playing have noticed the cloud of red dust that is going off the top of that island. They tell me that there are remains of the forests there—stumps that stand 5, 10 and 20 feet—large stumps at the base, standing on a pinnacle of earth and rock anywhere from 15 to 25 feet above the surrounding level of the sea and earth, showing that there was the level of the island and the level of the forest before it was destroyed. That same thing would happen to any part of the islands here with the destruction of the forests on the hills.”

NEW FARMERS' BULLETINS.

BULLETIN 52, REVISED.

The Sugar Beet: Culture, Seed, Seed Development, Manufacture and Statistics. Pp. 47, figs. 18.

This bulletin has been revised to include the most recent practices in sugar-beet culture, results of investigations as to diseases and insect pests, the development of the single germ seed, and statistics to date.

BULLETIN 339.

Alfalfa. By J. M. Westgate, Assistant Agrostologist, Bureau of Plant Industry. Pp. 48, figs. 14.

This bulletin is issued to supersede Farmers' Bulletin 215 on the same subject, and is published with the double purpose of pointing out the conditions under which alfalfa may be successfully grown and to indicate where and under what conditions the attempt would probably result in failure.

BULLETIN 340.

Declaration of Governors for Conservation of Natural Resources. Pp. 7.

The declaration of governors contained in this bulletin was adopted by the conference of governors of the States and Territories called by the President to consider the conservation of our natural resources, which met at the White House May 13, 14, 15, 1908.

BOARD OF AGRICULTURE AND FORESTRY.

DIVISION OF FORESTRY.

ROUTINE REPORT.

Honolulu, Hawaii, March 3, 1909.

Board of Commissioners of
Agriculture and Forestry,
Honolulu.

Gentlemen: I have the honor to submit the regular report of the Division of Forestry for the month of February.

During this month my own time has been rather largely taken up with matters in connection with the preparation of the annual report of the Board and of data for the use of the Legislature.

On February 4th I gave a ten-minute talk before the pupils of the McKinley High School on the meaning of forestry and the objects of the forest work being carried on by the Territory. Later in this present month, I have been asked to give two lectures in the popular course at the College of Hawaii, dealing with the same subject in a more extended manner.

CONSERVATION WEEK.

Perhaps the most important event of the last month in the way for forestry, as indicating the development of a better understanding of the importance of the subject, were the two Conservation meetings, held on Monday and Tuesday afternoons of this week. The meeting on Monday was a joint session of the Territorial Senate and House of Representatives at which the Governor and the Territorial Conservation Commission appeared to explain the meaning of the conservation movement and the reasons why provision should be made for more active participation by Hawaii in conservation work. Governor Frear outlined the growth and present status of the national movement for conservation. His speech was followed by short talks by Judge Dole, Honorable W. O. Smith, Mr. Jared G. Smith, Dr. E. V. Wilcox and by me.

The meeting Tuesday afternoon was held under the auspices of the College Club at the residence of Mrs. Frear. The principal paper of the afternoon was read by Mrs. Augustus F. Knudsen of Kauai, the delegate from Hawaii to the Woman's National Rivers and Harbors Congress, held at Washington, D. C., in December, 1908. The purpose of this meeting was to interest the women of the Territory in the great question of conservation. From the enthusiasm evinced by the large audience present it is evident that the friends of conservation in Hawaii may expect

from the women of Hawaii the same enthusiastic support that characterizes the action of the Women's Clubs in mainland states. In addition to Mrs. Knudsen's paper short addresses were given by Governor Frear, Judge Dole, Ex-Governor Carter, Bishop Restarick, Dr. Scudder and by me. A full account of both meetings including the speeches made, will be published in the March number of the Hawaiian Forester and Agriculturist.

FOREST FIRE—WAHIAWA.

On February 21st, a forest fire was reported from the Halemanu section, Waialua District, on this island, by the local District Fire Warden, Mr. W. M. Templeton. At Mr. Templeton's request Mr. Albert Alexander of the Wahiawa Consolidated Pineapple Company, with about 40 men, and Mr. Lord of the Waialua Agricultural Company, with about as many more, went to the fire and succeeded in extinguishing it before it had spread over a very large area, though the fire did get into the timber to some extent.

In connection with this fire the Attorney General has been asked to take steps leading to the prosecution of the persons guilty of starting the fire. On this matter there is as yet nothing to report.

FREE CONGRESSIONAL VEGETABLE SEED.

In the report of this Division for January mention was made that there had been received from the Delegate to Congress, Honorable J. K. Kalaniana'ole, his quota of congressional vegetable seed for free distribution. Early in February letters were sent to each of the leading newspapers in the Territory announcing that seed could be had by those who applied. Numerous letters have been received in response to this offer. To each of the persons applying a package of seed has been sent out.

DISTRIBUTION OF INTRODUCED TREES.

Arrangements have also been made during the past month to distribute to a selected list of persons throughout the Territory seed of the Japanese Cedar, the Benguet Pine (an important timber tree from the Philippines) and seedlings of the English walnut resulting from nuts produced by the walnut trees near Olinda, on Mt. Haleakala, Maui. All of these trees are valuable additions to our Hawaiian flora and will unquestionably do well in certain sections of the Territory. Now that the experimental garden in Makiki Valley has been got into working order it will be possible to do much more work in the way of plant introduction and distribution than has been possible in the past.

On his return from a trip to the Orient, Mr. F. W. Terry of

the Hawaiian Sugar Planters' Association Experiment Station, brought this Division seed of a number of interesting plants from Java.

USE OF THE BOARD LIBRARY.

On February 9th, the Hawaiian Poultry Association held a meeting in the library room of the Board.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

ENTOMOLOGICAL REPORT FOR FEBRUARY, 1909.

Honolulu, Hawaii, March 1, 1909.

Honorable Board of Commissioners of
Agriculture and Forestry,
Honolulu, T. H.

Gentlemen:—The Entomological Inspection for February in Honolulu involved the boarding of 25 vessels on 14 of which we found vegetable matter subject to our inspection. The result of this work is briefly shown in the following

TABLE OF INSPECTION.

<i>Disposal with Principal Causes.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	376	12,926
Fumigated and passed.....	35	45
Burned.....	8	10
Dipped in Bordeaux, Asparagus roots for rust.....	2	2
Total examined.....	421	12,983

MATTER DESTROYED.

All the burned articles hailed from the Orient. Five were oranges brought by Japanese immigrants and five were yams from China infested with pernicious fungus.

FUMIGATION OF COTTON SEED.

In the majority of cases the gas was administered to imported plants as a precaution against possible pests. Notable among them were four small sacks of cotton seeds. Our Federal Experiment Station is just now hard at work demonstrating the practicability of cotton growing on these islands. They seem to have advanced sufficiently to arouse the interest of some people and, in order to prevent the scramble for seeds of choice(?) varieties, imported from abroad with the attendant great danger of introducing the cotton boll weevil, this warning note is issued to the people. It should be known that the boll weevil is the great menace to the cotton industry in the United States at present. While it only infests a portion of the cotton belt, it is destructive to the extent of \$25,000,000 annually. In other words, the extent of its injury to cotton may be compared to that of our sugar cane leaf-hopper a few years ago. It would be calamitous therefore to introduce this pest just as cotton growing is beginning to promise such satisfactory results. The cotton seeds we fumigated came from Georgia, a State not yet invaded by the weevil, nevertheless we took the precaution. Far wiser still would it be for prospective cotton growers to secure their seed thru if not from the Hawaii Experiment Station. But in any event we shall fumigate imported cotton seed without fail.

The other ten lots fumigated were found infested with a variety of scale bugs, none of which are desirable. In a number of instances we were obliged to remove soil from roots, but our facilities at present for immediately wrapping such roots in wet sphagnum moss reduce the danger to plants so treated to a minimum.

SCORPIONS.

A passenger aboard the "Korea" from the Orient on the 19th brought a pair of South Java scorpions. Huge fellows they were and quite formidable in appearance. The gentleman reported them immediately upon arrival and consented to have them destroyed which was promptly done. As is well known scorpions are rather useful economically in that they are wholly insectivorous. The gentleman that brought them kept them alive for three months on flies and cockroaches. Nevertheless they are hardly desirable neighbors because of their poisonous sting.

BANANAS.

Bananas in Fiji are badly damaged by fruit-flies, on which account their importation to Hawaii is strictly prohibited and the regulation strictly enforced. Vessels coming from the South however, frequently carry on deck large quantities of bananas from Fiji to Vancouver. Such shipments unless well covered

le in port are liable to land here the pernicious fly. A request was therefore sent to the agents of these boats to instruct their officers aboard each of them to carefully and thoroughly ripen such bananas six hours before reaching port and keep them ripened until six hours after sailing have elapsed. This request was kindly granted by the agents in question.

WHARF ASSISTANT.

For some time it has been our practice to employ an additional assistant on wharves of ships bringing large vegetable cargoes. This was found of great assistance in dispatching the work which involves detaining perishable goods as little as possible, while it is insured nothing passing without our examination. This officer is stationed at the wharf exit and checks off wagon loads in accordance with a pass check, made out and signed by the inspector for articles passed.

LOCAL WORK.

Three local visits were made during the month and advice issued in accordance with the particular circumstances. Fear of a lack of appearance on foliage was allayed by explanation of its origin, most of which had by then disappeared. The necessity of proper pruning of trees was also pointed out. Scale bugs were found in the other two places and treatment was prescribed accordingly.

HILO INSPECTION.

Upon the work of inspection in Hilo during January and February Bro. M. Newell writes as follows:

“Thirteen foreign vessels came to anchor in Hilo Bay. Had inspections on board of two of them; nine inspections on the wharves, and thirteen inspections at the postoffice of forty parcels containing many varieties of seeds, bulbs and small plants. There were 192 lots and 3098 parcels.

Five crates of wormy garlic were sent back.

Twenty boxes of apples were fumigated on account of greedy scale.

Fifty sacks of “River” spuds were cleaned on the wharf before being admitted.

Two dozen fruit trees from California were fumigated, though apparently free from pests.

Two parcels of seed by mail were destroyed on account of evils.”

Yours respectfully,

JACOB KOTINSKY,

Superintendent of Entomology.

ENTOMOLOGICAL REPORT FOR MARCH, 1909.

Honolulu, Hawaii, April 13, 1909.

Honorable Board of Commissioners of
Agriculture and Forestry,
Honolulu, T. H.

Gentlemen:—During the month of March we boarded 36 vessels and found matter for inspection on 20 of them. The following table gives a concise summary of the inspector's activity during the month.

TABLE OF INSPECTION.

<i>Disposal with Principal Causes.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	377	8,379
Fumigated before passing.....	20	20
Burned.....	11	14
Ordered returned	2	13
Dipped in Bordeaux before passing.....	2	2
Total examined.....	412	8,428

SUGAR CANE AND YAMS FROM ORIENT.

Notable among the articles burned were one lot of fungus infested yams from the Orient, and one of badly borer-eaten sugar cane brought by a Chinese immigrant from Hong Kong. The method of arrival of this cane points to a source of danger fortunately well within our control, as the customs and immigration authorities give us heartiest coöperation in the discovery of such matters. An officer of this Division is always present when the immigrants' baggage is searched by the Customs officials

MITEY GARLIC.

It is not usual for this article to be infested. A high percentage was decayed and infested with mites. The present instance is doubtless due to long storage, but admission was denied it, nevertheless.

FUMIGATION.

Fumigation and other treatment, such as removal of soil from roots, etc., was administered in the majority of cases as a means of precaution. One lot of ornamental plants from Sydney con-

at least two of which are not well known to us.

MISCELLANEOUS WORK.

Two lots of useful insects, doubtless horn fly parasites, were received from Mr. Koebele during the month and turned over to Dr. Perkins of the H. S. P. A. for attention

Three evening lectures profusely illustrated with lantern slides were delivered at the College of Hawaii on the following topics: "Inspection, object, method, results"; "Our Insect Pests"; "Our Insect Friends." One morning talk on "Insects, How to Collect and Preserve Them," was given at the McKinley High School at the request of Mr. Babbitt and, judging from later comment, was well received.

The Inspector's assistant, Mr. Kuhns, was sick in bed during the first half of the month. With occasional assistance from extra help we managed to get along. But such incidents point to the immediate necessity of an assistant in the Division.

To Midway we sent a colony of *Vedalia* by the "Flaurence Ward" to help the cable people there fight the cottony cushion scale which is checking the growth of the ironwood trees planted there some time ago.

Respectfully yours,

JACOB KOTINSKY,

Superintendent of Entomology.

DIVISION OF ANIMAL INDUSTRY.

REPORT OF THE TERRITORIAL VETERINARIAN.

March 3, 1909.

Mr. President and Members of the Board:

I beg to report on the work of the Division of Animal Industry since the meeting on February 3d, as follows:

GLANDERS.

In the beginning of February a suspicious case was reported from a local dairy. The animal was isolated and submitted to the mallein test. The case proved not to be glanders, but to be chronic nasal catarrh.

About the same time a gentleman reported that a horse which he had brought to his home from the district of Kailua on this island showed suspicious symptoms. The animal was removed to the quarantine station in Kalihi and submitted to the mallein test. An examination showed considerable discharge from both nostrils and snorting respiration. The sub-maxillary glands were not swollen and the animal showed not the slightest reaction to the mallein test. Since then the animal has somewhat improved but is still continued in quarantine for further observations.

On the 19th ult. I was informed that a horse in a pasture makai of the Kamehameha schools in Kalihi was showing profuse discharge from the nose and being in a very emaciated condition. On examination the following day the animal was found dead, but showed unmistakable symptoms of glanders and farcy. On the right hind leg were numerous farcy buds and ulcers.

According to the owner's statement the horse had been in the pasture for about one month together with seven other horses and one mule. All of these animals were removed to the quarantine station in Kalihi and submitted to the mallein test. None of them showed any reaction and they were subsequently returned to the pasture where in the meantime the dead animal had been destroyed by burning, under the supervision of the Board of Health. The pasture has been placed in quarantine until further notice.

On the 25th ult. I was notified that one horse, apparently suffering from glanders, had been observed in a pasture in the Kailua district of this island and which is leased to a rice company. On the 27th I drove to this pasture where I was met by the foreman of the Kancohe ranch and one cowboy. The entire pasture was rounded up and was found to contain 44 horses and 14 mules. The suspected animal was found to be affected with glanders and farcy to an extreme degree, there being no less than fifty ulcers and farcy buds on the hind legs and a profuse discharge from both nostrils and greatly enlarged sub-maxillary glands.

The caretaker of the pasture was instructed to bury the animal after it had been killed and the only watering trough in the pasture was emptied out, cleaned and disinfected. None of the other animals showed any symptoms of glanders, but it is more than probable that some of them will develop the disease later on as all of them had been drinking from the same trough with the affected animal. The following letter of instruction was sent to the manager of the company in question:

"I was informed last week that a disease, presumably glanders, had appeared among the horse stock kept by you in the Keolu pasture in Kailua. On Saturday last I drove over there and had all of the animals rounded up in the pen adjoining the house where the caretaker lives. I found one very bad case of glanders and was informed by the caretaker that the affected animal belongs to one Ah You of Kailua and that the horse had been in your pasture for about one month. I took this animal to a place

designated by the caretaker and shot him, the caretaker agreeing to burn the carcass before dark the same day.

"There being only one watering trough in the pasture I had the same emptied and cleaned out and notified the caretaker under no circumstances to allow any of the horses or mules in the pasture to leave the same within one month from date, or to allow any other horse stock to be brought into the pasture for any purposes whatever.

"You are hereby notified that the pasture in question, Keolu, in the district of Kailua, is quarantined for one month from February 27th and you are directed to notify the manager and the caretaker of the said pasture not to allow any horse stock, that is (horses, mules or asses) to leave the said pasture during the period specified, nor to allow any horse stock to be brought into the said pasture for any purposes whatever.

"I have taken a careful count of the animals now in the pasture and shall visit the same off and on during the period of quarantine for the purpose of inspecting and counting the stock in question, as it is highly probable that some cases will develop through contamination of the drinking water.

"I further call your attention to the fact that any violation of these instructions, which are supported by Rule 3 of the Division of Animal Industry of this Board, a copy of which is enclosed, is a misdemeanor and punishable by a fine not to exceed \$500.

"Will you please acknowledge receipt of this letter without delay and inform me what steps you have taken to carry out the instructions contained therein."

HOG CHOLERA.

On February 10th I was notified by a gentleman at Waialua that his hogs were dying and with the consent of the Committee on Animal Industry I left the following day for that place. I found on examination that 25 pigs and sows had died within three days and post mortem examination proved the disease to be hog cholera and swine plague.

I learned on further investigation that this disease has been prevalent in that district for the past two months and that considerable numbers of hogs belonging to various owners had died.

The usual medicinal treatment as recommended by the Bureau of Animal Industry was instituted while the remaining affected ones were segregated and the yards, pens and feed troughs were disinfected.

The disease appears to be of a very mild nature as only pigs up to 30 or 40 pounds succumb to it, while the grown animals either resist it or become only mildly affected.

SHEEP DISEASE ON LANAI.

On the 23d ult. I was notified by the local agents for the Lanai Ranch that five of the imported New Zealand sheep had died from an unknown disease and that much apprehension was felt in regard to the remaining animals. The intestines of one of the dead animals had been sent to Honolulu, but a very careful examination of the same failed to furnish any clue to the nature of the disease. The Assistant Territorial Veterinarian was, therefore, instructed by the Committee on Animal Industry to proceed to Lanai for the purpose of investigation. He reports under date of the 27th ult. that during the four days he had been on the island no further cases had developed and that the remaining imported sheep were all in fine condition. He decided, however, to remain for another week, but may return by tomorrow's "Claudine."

ARRIVALS OF LIVE STOCK.

It is a pleasure to report that during the first two months of the year there have arrived more high class stock for breeding purposes than during the entire preceding year. On the 12th ult. the S. S. Missourian brought 24 head of Hereford bulls and heifers imported by Mr. A. W. Carter for the Parker Ranch. These animals made an exceedingly fine appearance and are undoubtedly among the best ever imported here. They have been kept, since their arrival, at the Union Feed Company's stables on the Beach road where they have been submitted to a disinfectant wash, while the larvae of the heel fly, the so-called "grub in the back," have been squeezed out as soon as they have made their appearance.

On the 16th ult. the "Lurline" arrived with 21 mules for the Schuman Carriage Company and 24 mules for the Kahului Railroad Company. The former were quarantined in Mr. Schuman's pasture while the latter remained on board the Lurline and were unloaded at Kahului, Maui, where the Deputy Territorial Veterinarian for that district took charge of them under instructions forwarded to him from this office.

On the 19th ult. the schooner "Defender" arrived at Honoipuu, Hawaii, with 30 head of mules consigned to the Hawi and Hala wa Plantation Companies in Kohala. The schooner had been twenty-four days on the way from San Francisco and the quarantine period had, therefore, expired by the time the animals arrived in the Territory. Permit to land the mules at Honoipuu had been granted with the understanding that the owners defray all expenses in connection with the inspection of the animals after arrival, it being necessary to have the Deputy Territorial Veterinarian from Hilo come to Kohala for this purpose.

On March 1st the S. S. "Arizonan" arrived with 79 horses for Fifth Cavalry. All of these animals had been mallein tested before shipment from San Francisco and were accompanied by certificates approved by the Federal inspector of that port. They were furthermore in charge of one of the veterinarians of the Fifth Cavalry who reported that no sickness had occurred among the animals since they left San Francisco. Only two of them showed slight symptoms of shipping fever and these two have been segregated at the quartermaster's corral in Iwilei. The remaining 77 head are also kept at the same place where they will be kept for a few days previous to being taken to Leilehua where they will be kept segregated for the required quarantine period. The same steamer brought four race horses consigned to Domingo Ferreira. They were taken to the quarantine station on the Beach road.

On the 2d inst. the U. S. Transport "Dix" arrived with 475 horses and mules intended for the Philippine Islands. The animals were unloaded and taken to the quartermaster's corral in Iwilei for a few days' rest while the transport is taking on coal. All of these animals had been mallein tested before shipment and the accompanying quartermaster veterinarian stated that no sickness had occurred among them since they left Seattle.

Very respectfully,

VICTOR A. NÖRGAARD,
Territorial Veterinarian.

RECENT PUBLICATIONS.

FARMERS' BULLETIN 345.

Some Common Disinfectants. By M. Dorset, Chief of the Bacteriologic Division, Bureau of Animal Industry. Pp. 12.
A brief description of the value and methods of application of formaldehyde, carbolic acid, crude carbolic acid, creosol, chlorinated lime, and bichloride of mercury.

SEPARATES.

From Annual Report of the Office of Experiment Stations, 1907)
Statistics of Land-grant Colleges and Agricultural Experiment Stations, 1907. Compiled by Miss M. T. Spethmann. Pp. 199-206. (O. E. S., Doc. 1131.)
Progress in Agricultural Education, 1907. By Dick J. Crosby, Specialist in Agricultural Education, Office of Experiment Stations. Pp. 237-306, figs. 18. (O. E. S., Doc. 1132.)
Losses of Irrigation Water and Their Prevention. By R. P. Heile, Expert in Irrigation Institutions, Office of Experiment Stations. Pp. 369-386. (O. E. S., Doc. 1135.)

BY AUTHORITY.**JOINT RESOLUTION NO. 1.**

Be it Enacted by the Legislature of the Territory of Hawaii:

That as soon as may be after the approval of this resolution, the Governor appoint a commission of three members, who shall be experienced and competent persons, which commission shall thoroughly investigate and examine into the matter of fruit growing and truck farming throughout the Territory and the handling and disposal of the products derived therefrom, together with the feasibility of giving public aid thereto by providing assistance in the matter or refrigeration, packing, transportation, marketing or any like subject. The conclusions reached by such commission shall be embodied in a report to be made by them to the Governor not later than July 1, 1910, together with their recommendations as to legislation if such is needed, which report shall be laid before the next Legislature by the Governor.

Approved this 27th day of February, A. D. 1909.

WALTER F. FREAR,
Governor of the Territory of Hawaii.

LEGISLATIVE ACTS RELATING TO AGRICULTURE.**ACT 4.****AN ACT**

MAKING SPECIAL APPROPRIATION FOR THE PURPOSE OF ASSISTING HAWAII'S EXHIBIT AT THE ALASKA-YUKON-PACIFIC EXPOSITION.

Be it Enacted by the Legislature of the Territory of Hawaii:

Section 1. The sum of Twenty-five Thousand Dollars (\$25,000.00) is hereby appropriated, to be paid out of moneys in the Treasury received from current receipts of the general revenue of the Territory, for the purpose of assisting and aiding the Board of Commissioners for the Territory of Hawaii of the Alaska-Yukon-Pacific Exposition in effecting Hawaii's exhibit of its commercial, industrial and educational progress and conditions at said Exposition which will take place in Seattle, Washington, U. S. A., in the month of June, A. D. 1909.

Section 2. Appropriations made under this Act shall be under the control of and expended by the Secretary of the Territory of Hawaii.

Section 3. This Act shall take effect from and after the date of its approval.

Approved this 1st day of March, A. D. 1909.

WALTER F. FREAR,
Governor of the Territory of Hawaii.

ACT 5.**AN ACT**

TO PROVIDE FOR ENTERTAINMENT AND EXPENSES OF SUCH SENATORS AND MEMBERS OF THE HOUSE OF REPRESENTATIVES OF THE UNITED STATES AND OTHER DISTINGUISHED PERSONS AS MAY VISIT THE TERRITORY OF HAWAII PRIOR TO JUNE 30, 1911.

Be it Enacted by the Legislature of the Territory of Hawaii:

Section 1. The sum of Twenty Thousand (\$20,000.00) Dollars is hereby appropriated to be paid out of any moneys in the Treasury of the Ter-

ritory received from the general revenue of the Territory, for entertainment and expenses of such Senators and Members of the House of Representatives of the United States and other distinguished persons who may visit the Territory of Hawaii prior to June 30, 1911.

Section 2. The moneys hereby appropriated shall be under the control of and expended by the Secretary of Hawaii.

Section 3. This Act shall take effect from and after the date of its approval.

Approved this 1st day of March, A. D. 1909.

WALTER F. FREAR,
Governor of the Territory of Hawaii.

ACT 9.

AN ACT

TO ENCOURAGE DIVERSIFIED INDUSTRIES.

Be it Enacted by the Legislature of the Territory of Hawaii:

Section 1. For the three years from December 31, 1909, all property, real and personal, solely and actually used in the cultivation and production of cotton shall be exempt from property taxes thereon.

Section 2. This Act shall take effect from and after the date of its approval.

Approved this 5th day of March, A. D. 1909.

WALTER F. FREAR,
Governor of the Territory of Hawaii.

ACT 10.

AN ACT

TO AMEND SECTION 491 OF THE REVISED LAWS RELATING TO THE PURPOSES FOR WHICH PRIVATE PROPERTY MAY BE TAKEN FOR PUBLIC USES.

Be it Enacted by the Legislature of the Territory of Hawaii:

Section 1. Section 491 of the Revised Laws is amended to read as follows:

"Section 491. Purposes for taking private property. Private property may be taken for the following purposes, which are declared to be public uses, to wit: sites for public buildings, schools and school recreation grounds, fortifications, magazines, arsenals, navy yards, navy and army stations, light-houses, range and beacon lights, cemeteries, quarantine stations, pest-houses, hospitals, dumping places for garbage and refuse material, wharves, docks, piers, dams, reservoirs and bridges, also all necessary land over which to construct roads, canals, ditches, flumes, aqueducts, pipe lines and sewers; also all necessary land for the growth and protection of forests, public squares and pleasure grounds; also all necessary land for improving any harbor, river or stream, removing obstructions therefrom, widening, deepening or straightening their channels; also all necessary land from which to obtain earth, gravel, stones, trees, timber, and all necessary material for the construction of any public work."

Section 2. This Act shall take effect upon its approval.

Approved this 5th day of March, A. D. 1909.

WALTER F. FREAR,
Governor of the Territory of Hawaii.

ACT 21.

AN ACT

TO AUTHORIZE CERTAIN PUBLIC OFFICIALS TO DESIGNATE PERSONS TO ACT IN THEIR ABSENCE AND TO DEFINE THE POWERS OF PERSONS SO DESIGNATED.

Be it Enacted by the Legislature of the Territory of Hawaii:

Section 1. The Superintendent of Public Instruction, the Surveyor, the Commissioner of Public Lands, the Superintendent of Public Works, the President of the Board of Health, the President of the Board of Agriculture and Forestry and any other officer for the performance of whose duties in his absence or illness no other provision is made by law, may, with the approval of the Governor, designate some other officer in his department, bureau or office to act in his temporary absence or illness. Such designation shall be in writing and shall be filed in the office of the Secretary of the Territory. Provided, however, that the respective heads of departments hereinabove designated shall be responsible and liable on their official bonds for all acts done or performed by the persons designated to act in their absence as herein prescribed.

Section 2. Such persons so designated shall, during the temporary absence or illness of the head of such office, have all the powers of the head of such office and shall be known as the acting Superintendent, Surveyor, Commissioner or President, as the case may be, but shall not be entitled to any additional compensation while so acting.

Section 3. This Act shall take effect upon its approval.

Approved this 13th day of March, A. D. 1909.

WALTER F. FREAR,
Governor of the Territory of Hawaii.

BOARD OF AGRICULTURE AND FORESTRY OF THE TERRITORY OF HAWAII.

DIVISION OF ENTOMOLOGY.

REGULATION No. 6.

Whereas, by order of the Commissioners of Agriculture and Forestry, dated September 1, 1903, owing to the prevalence of a serious plant disease on pineapples in the Australian Colonies further importation into the Territory of pineapple plants, shoots and suckers was prohibited, and

Whereas, there has been established at the Port of Honolulu sufficient facilities for the proper disinfection and quarantine of such plants,

Now Therefore, by virtue of the powers conferred upon us by law and with the approval of the Governor of this Territory, we, the Board of Agriculture and Forestry of the Territory of Hawaii, at a regular meeting assembled hereby order that entry of importations of pineapple plants, shoots or suckers into the Territory of Hawaii from the said Australian Colonies be, and the same is hereby permitted at the Port of Honolulu, subject to such inspection, treatment and quarantine as the Board or its duly appointed agent may deem necessary to safeguard the agricultural interests of this Territory against the introduction of possible pests of insect, fungus or any other parasitic nature.

This regulation shall take effect from the date of its approval.
Approved:

W. F. FREAR,
Governor of Hawaii.

Honolulu, T. H., January 20, A. D. 1909.

ACT 33.

AN ACT

PROMOTE THE CONSERVATION AND DEVELOPMENT OF THE NATURAL RESOURCES OF THE TERRITORY THROUGH IMMIGRATION AND OTHER MEANS BY IMPOSING A TAX ON INCOMES AND APPROPRIATING THE PROCEEDS FOR SUCH PURPOSE.

Enacted by the Legislature of the Territory of Hawaii:

Section 1. In addition to the tax of two per cent., authorized to be levied, assessed and collected upon the gains, profits and income of persons in the Territory of Hawaii under the provisions of Chapter ninety-nine of the Revised Laws of the Territory, as heretofore amended, there shall be levied, assessed and collected annually upon the gains, profits and income over and above Four Thousand Dollars derived by every person residing in the Territory, from all property owned, and every business, trade, profession, employment or vocation carried on, in the Territory, and by every person residing without the Territory from all property owned, and every business, profession, employment or vocation carried on in the Territory and by every servant or officer of the Territory, wherever residing, a tax of two per cent. on the amount so derived during the taxation periods defined by this Act.

Section 2. In addition to the tax of two per cent. authorized to be levied, assessed and collected upon the gains, profits and income of corporations as provided in said Chapter ninety-nine of the Revised Laws of the Territory, as heretofore amended, there shall be levied, assessed and collected annually upon the net profit or income above actual operating and business expenses derived during the taxation periods defined by this Act, from all property owned, and every business, trade, employment or vocation carried on in the Territory, of all corporations doing business for profit in the Territory, no matter where created or organized, a tax of two per cent. on the amount so derived during the taxation periods as defined by this Act. Provided, however, that nothing herein contained shall apply to corporations, companies or associations, conducted solely for charitable, religious, educational or scientific purposes, including fraternal beneficiary societies, nor to insurance companies, taxed on a percentage of the premiums under the authority of another law.

Section 3. The taxation period within the meaning of this Act shall be the year immediately preceding the first day of January of each year in which such tax is payable. Provided, that the first taxation period under this Act shall be the year immediately preceding the first day of January, 1909, and that the rate of taxation upon incomes derived during said first taxation period shall be one per cent. in addition to the tax assessed thereon under said Chapter ninety-nine of the Revised Laws as heretofore amended, and the amount of such tax shall be assessed forthwith and be payable in full on or before the fifteenth day of November, 1909.

Section 4. All of the provisions of Sections 1280 to 1289 both inclusive, of said chapter ninety-nine of the Revised Laws of the Territory, as heretofore amended, in so far as the same are consistent with this Act and may be used in furtherance of the purposes hereof, shall apply to this Act as fully as though incorporated herein.

Section 5. All amounts collected from time to time under the provisions of this Act shall constitute and be held by the Treasurer of the Territory as a special fund notwithstanding the provisions of Act 15 of the Session Laws of 1907, or any law now in force, to be used and applied for the purposes specified by this Act and not otherwise, that is to say: Three-fourths of said fund is hereby appropriated for and shall be used for the encouragement of immigration to the Territory of Hawaii in aid and development of the agricultural resources and conditions, including the

expenses of the Board of Immigration, the same to be available for expenditure from time to time as shall be determined by the Board of Immigration with approval of the Governor; and one-fourth of said fund is hereby appropriated for and shall be used for the development, conservation, improvement and utilization of the natural resources of the Territory, the same to be made available for expenditure at such times and in such manner as a board of three persons appointed as provided in Section 80 of the Organic Act shall, with the approval of the Governor, determine.

Section 6. This Act shall be in effect from the date of its approval, and relate retrospectively to give full effect to the provisions herein contained with respect to taxes for the first taxation period hereunder; and shall continue in force to and until the thirty-first day of December, 1911; provided, that all taxes assessed under the provisions of this Act which shall remain unpaid at the end of said period shall be subject to collection and enforcement in the same manner as though all the provisions of this Act were still in force with respect thereto.

Approved this 22nd day of March, A. D. 1909.

WALTER F. FREAR,
Governor of the Territory of Hawaii.

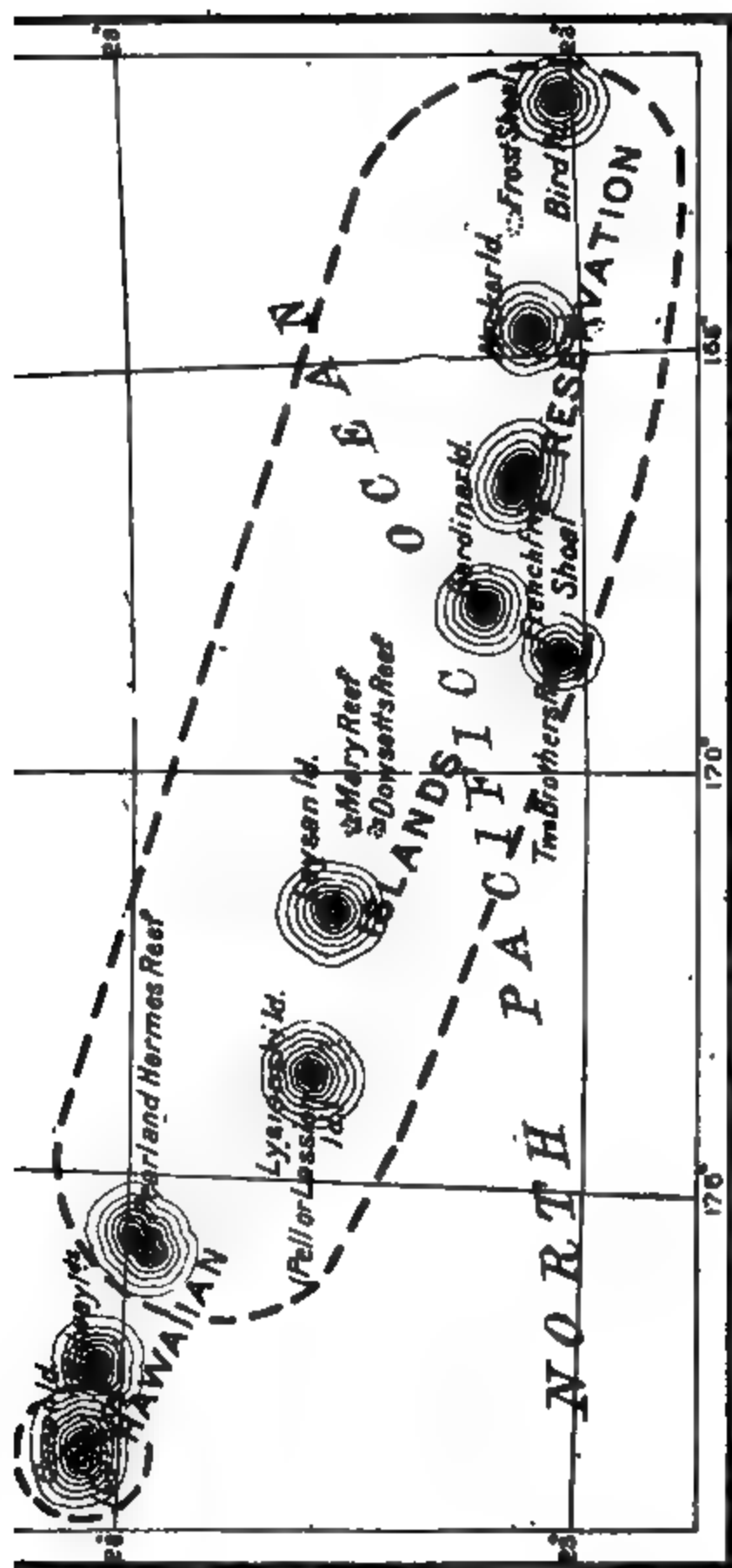
EXECUTIVE ORDER.

It is hereby ordered that the following islets and reefs, namely: Kure Island, Pearl and Hermes Reef, Laysan Island, Marv Reef, Dowsetts Reef, Gardiner Island, T Brothers Reef, French Frigate Shoal, Neckar Island, Frost Shoal and Bird Island, situated in the Pacific Ocean at and near the extreme western extension of the Hawaiian archipelago, between latitudes twenty-three degrees and twenty-nine degrees north and longitudes one hundred and sixty degrees and one hundred and eighty degrees west from Greenwich, and located within the area segregated by the broken lines shown upon the diagram hereto attached and made a part of this order, are hereby reserved and set apart, subject to valid existing rights, for the use of the Department of Agriculture as a preserve and breeding ground for native birds. It is unlawful for any person to hunt, trap, capture, wilfully disturb, or kill any bird of any kind whatever, to take the eggs of such birds within the limits of this reservation except under such rules and regulations as may be prescribed from time to time by the Secretary of Agriculture. Warning is expressly given to all persons not to commit any of the acts herein enumerated and which are prohibited by law.

This reservation to be known as the Hawaiian Islands Reservation.

THEODORE ROOSEVELT.

The White House, February 3, 1909.



HAWAIIAN ISLANDS RESERVATION.

DRY FARMING.

A great deal of attention has been given of recent years to a system of cultivation upon lands which have a scanty rainfall and no available irrigation supply. At a time when the general watch-word of the country is "Conservation" it may be worth while to call attention to this comparatively new method of crop management termed "Dry Farming," which has for its object the conservation of the natural rainfall. As the system has many enthusiastic advocates and has proved undoubtedly valuable on semi-arid tracts on the mainland, it would be well at this time to ascertain by suitable experiment whether its adoption in certain localities of the islands would not result in bringing into agricultural use land which hitherto has been not profitable to cultivate.

The term "dry farming" is of itself to an extent misleading, as it is self evident that no crop can be produced without a certain supply of moisture—for all plant food must be presented in soluble form to the root system before absorption into the plant. The object of dry-farming, however, is to produce crops without artificial water supply. This is accomplished by a series of operations which look to the most economical use of the available rainfall.

Speaking generally it is found that an annual rainfall of twelve inches if properly conserved, is sufficient for the production of crops when "dry farming" methods are practiced. The loss of moisture from land may be said to be due to three main causes, "run-off," seepage and evaporation. Of these the first may be prevented largely by contour furrows and the construction of the usual barriers and reservoirs. Loss from seepage is largely prevented by deep plowing and by compacting the lower layer of soil. It is not, however, to these, the most obvious sources of loss, that depletion of soil moisture is mainly due, but to the less suspected cause of evaporation.

After a heavy rainfall the surface of the soil presents a cracked and dry appearance forming a crust, which may be thought to act as a preventative against loss of moisture. Such, however, is not the case, for this cracked and flaked crust acts as the most perfect medium for the diffusion of moisture from the soil to the air. This is brought about by the force known as "capillary attraction" which permits evaporation as rapidly as water can be brought to the surface of the ground and continues it until all moisture within reach of the root system of crop-plants is exhausted.

The principle of moisture being conducted between the interstices of contiguous surfaces is familiar to all. Its most useful application is perhaps made in the ordinary lamp wick, between whose filaments the oil is rapidly sucked up for combustion. Such a process is at work when the medium of the cellular flake of dried earth connects the moist substratum of earth with the warm over—

ing atmosphere. Another instance of capillarity, which may perhaps render this process more obvious, is seen when a cube of sugar is held in contact with the surface of a cup of coffee.

In order to prevent this enormous loss from evaporation, the dry-farming method is to break up the surface crust as soon after rain as practical. By this means not only is the process of capillarity prevented but the roughened layer of soil acts as a mulch which checks evaporation.

By practicing the three methods of moisture conservation briefly described, land which receives an altogether inadequate supply of rain for ordinary farm methods is said to be rendered amply productive. Among other rules of "dry-farming" methods which are most often reiterated may be here mentioned deep plowing, and cultivation and harrowing as soon as the ground is sufficiently dry.

The practice of breaking up the surface crust to prevent capillary action is one which may well be introduced as an adjunct to ordinary farming methods, where the rainfall is not regular or where watering by hand is depended upon. By this means the periods between watering may be lengthened and the labor correspondingly lessened. For some time this plan has been followed with vegetable crops in a garden near Honolulu with satisfactory result.

SHELTER TENT TOBACCO.

A publication has recently been received from the Pennsylvania State College Agricultural Experiment Station upon Shelter-Tent Experiments with Smyrna-type Tobacco, by William Frear. The station commenced experiments to determine whether by the aid of shelter tents such as had been more or less successfully used in Florida and Connecticut, wrapper leaf of the Sumatra type could be produced profitably in Pennsylvania. The peculiar features of this method of culture are the use of slacked or open meshed cheese-cloth shelters,—which exclude the insects, diminish air movements about the plants and increase the moistness of the air,—close planting, high topping, harvesting each leaf separately instead of cutting the entire stalk and curing the leaf before its removal therefrom, and, finally, sweating in bulks rather than in cases. The annual reports of the Pennsylvania Station for 1902 to 1904 contain accounts of the earlier experiments. They show that a thinner leaf was secured upon the light Penn sandy loam of the northern townships than upon the Norfolk gravelly loam soil bordering the Susquehanna that was first used for these experiments. The leaf exhibited, when tested in cigar manufacture under factory conditions, some defect in elasticity and burning quality, but yet displayed large covering power, fineness of vein, and good luster. The experiments were therefore continued to certain how far seasonal differences might affect the quantity

and quality of the leaf, how far the defects observed might be diminished by modifications in the selection and culture of the plants; and also to ascertain more accurately the cost of producing such leaf.

Briefly summarized the results achieved were:

- (1) Crops of cured leaf averaging from 1200 to 1700 pounds per acre.
- (2) Loss in sweating and assorting of 21.7 per cent.
- (3) Quality: 75 per cent. of wrapper, of which nearly half was light in color.
- (4) Size: 60 per cent. of rather large leaves, over 16 inches in length.
- (5) Manufacturing test showed high covering capacity and improved burning quality. A general rating above all domestic Sumatra-type tobacco except the better Georgia and Florida grades.
- (6) Cost: 45 cents per pound of cured leaf, indicating for the sweated and sorted leaf a cost not exceeding 65 to 70 cents per pound.

PINEAPPLE SHIPPING EXPERIMENTS.

The enormous expansion of the Hawaiian pineapple industry during the last few years and the rapidity with which new land is still being brought under cultivation for this purpose has brought with it the fear that the immense production would soon exceed demand and thus result in depression in this now prosperous industry. With the conviction that the best preventative of overproduction is to be found in perfecting and extending the means of distribution, and that the best advertisement for the Hawaiian pineapple is to bring the actual fruit before the consumers of cities hitherto inaccessible to our product, the Hawaii Agricultural Experiment Station has continued its investigations in pineapple shipping during the past season.

The experiments were on a coöperative basis, being entered into by the Wahiawa Consolidated Pineapple Company, the Hawaiian Pineapple Company, the Thomas Pineapple Company, the Matson Navigation Company and the Hawaii Experiment Station. The shipment was made on the steamship "Hilonian" which sailed from Honolulu August 11, 1908.

The results of the above experiments are embodied in Press Bulletin No. 22 of the Hawaii Agricultural Experiment Station written by Mr. J. E. Higgins, who has been in charge of this work. Bulletin 14 and Press Bulletin No. 21 of the Station also contain much data relative to the shipping and marketing of Hawaiian pineapples and should be studied by all growers.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. VI

APRIL, 1909

No. 4

POULTRY AND PROFITS.

By PROFESSOR B. E. PORTER, College of Hawaii.

Of the various branches of animal industry there is probably none that brings such quick returns as poultry keeping

It matters not whether the poultry raiser desires to produce eggs, meat in the form of broilers, mature fowls, or capons, the product is ready for market within a comparatively short time. The fact that so little time is required for the development of a paying business makes poultry keeping an attractive occupation for those having little capital, and who must enter some business that will bring quick returns.

Poultry culture has many peculiar and pleasing features which make it well suited to persons of either sex who are unable physically, or who do not desire, to perform heavy manual labor or any work that requires the outlay of considerable effort and strength.

Unless it is desirable to raise all, or nearly all, of the grain which the fowls require, on the same place on which they are kept, little land will be required. It is surprising what can be done on a place as small as a city lot. If the grain food be purchased, very little land is necessary—only enough for the houses, yards and sufficient space upon which green and succulent food can be grown. Then again the kind of products desired will largely determine the amount of necessary space.

Fowls are the friends alike of the rich and the poor; they are interesting too, because they have life, and because they respond so promptly and generously to good care and management; then they are beautiful of plumage, symmetrical in shape and some are so graceful in their carriage.

Poultry keeping is a decidedly healthful occupation. The work can be done by people not in the best of health and sometimes with very beneficial results.

The disadvantages in poultry raising in some localities are very great because climate is so variable and epidemic diseases are so prevalent. Then however well the poultryman may plan the details of operation, when it comes to practical execution in managing the hens and the work, chickens have their enemies, evil habits and many other troubles so often due to neglect.

Now let us enter into the real business of poultry raising. First we must know, as near as possible, the essentials which will bring about success, but many times the failure to succeed is attributable to a very small matter. Some say that a man doesn't know enough, is careless, and many other slighting things.

The man himself counts for so much that I think it well to consider his qualifications. First of all he must have a particular liking for animal life, and you may say, a love for good, lively, healthy looking birds. He needs the qualities of the brightest merchant. To be successful, he should be sagacious and shrewd, capable of planning well and executing completely.

To get along well he must have a system developed in all its details and be regular in his habits. The crowning characteristic is the quality termed "common sense." Then again he must be a student of market requirements, tireless in his attempts to satisfy a market with high quality poultry products put up in attractive packages. He should be a student of the principles of breeding, methods of improvement and factors of feeding, and never be conceited and so satisfied that progress is limited.

Let the poultryman decide to make poultry his life study, using the instruction gained, profiting by the experience of other poultrymen, acquiring wisdom from his successes and failures an

always welcoming any new practical ideas which will help on his poultry progress.

The beginning in poultry keeping can be and ought to be modest and the growth of the business should be gradual. A small flock and little land will enable one to commence in the industry. After experience has been gained, larger investments may be made with safety and without so much loss. If one has never kept chickens before, he may commence by buying a setting of eggs and a hen or a number of eggs and an incubator. Many times valuable experience can be gained by working for a man who has made a fair amount of success with poultry.

DR. HIGH'S WHITE PLYMOUTH ROCK COCK.

In the country the range is more or less free and the cost of fencing is usually very slight, but in the city chickens must be confined. And moreover the necessary confinement increases with the number of birds and the space enclosed. Wire costs in proportion to the height; 1½ inch mesh 3 feet wide is quoted at 12 cents per foot; 4 feet wide at 18 cents per foot. Posts cost from 15 cents to 25 cents a piece and lumber is quoted at \$29.00 per thousand, and good galvanized mosquito netting is about 6 cents per foot. Low widths of wire may be used if a heavy wire is

fastened on top of the posts to which the netting may be fastened. One wing of the fowls may be clipped and thus the chickens can be kept in more safely. To roughly estimate it should not cost more than \$100 to enclose a lot 50x150 and a good house could be put up for about \$50 or \$60. It does not take much room for a small flock but chickens do best when they have plenty of good free range.

SELECTING STOCK.

When commencing poultry raising it is advisable to select stock for a particular line of production. Let the stock be noted for egg production or fancy broilers. The market is good for both kinds of birds. Don't have dual-purpose fowls, have specialists; then the breeding and feeding problems are more easily solved.

For egg production, select breeds from the **Mediterranean class**, and for broilers choose an **American or Asiatic variety**. An American or Asiatic fowl may lay as many eggs as the lighter breeds, but when the results are totaled the economy of egg production is usually in favor of the smaller hen, because her cost of maintenance is less.

To have a flock of good laying hens, special attention must be given to their selection. If possible, get pullets from breeders who are reliable and are known to have good birds.

Ordinary fowls may do until the flock can be replaced by others from a breeding flock which has been selected with special care.

The inexperienced poultryman will find that breeders recognize that a laying hen has a particular type and form closely correlated with egg production. A laying hen is not fat. She has a red comb, a clear eye and a hearty appetite. In form she has a long body, wide in the breast for a large craw, flat and wide in the back and is not heavy in the region of the fluff.

The male bird for the breeding flock should not be anything but the best. A knowledge of the laws of breeding will help the beginner to understand why good prices are asked and received for superior stock.

After the buildings are built and the fowls put in the yard, real work begins. Care must be given to the feeding so that the hens will not get over fat and cease laying.

Vermin and disease must be kept off the fowls. Water, grit and shell forming materials are needed. Records should be kept so that the poor laying hens can be removed from the flock. Trap nests are valuable for such work. Many who were at the recent poultry show remember the model presented by the College of Hawaii.

To handle successfully the present opportunity to poultrymen, the recent poultry show was a decided help. There breeders brought together the result of their best efforts, which were, indeed, highly commendable. The fowls exhibited showed high

quality and gave evidence that some masters in the art of breeding and conditioning stock had been at work. Their work fully demonstrated the fact that they were close students of superior fowls and the standard of perfection, which, by the way, should be in the hands of every breeder.

Poultry culture is a vocation which gives ample opportunity for the deepest study, unlimited play for the best talents and abundant room for the most skillful practice. The poultryman of today, who is equipped with a natural inclination for the calling, interested in the industry, trained in all the care and management of the fowls, especially educated for the business and not afraid to work hard with both brain and brawn, is prepared to act with intelligence and may become not only a successful breeder of

WHITE PLYMOUTH ROCK PULLETS.

thoroughbred poultry and producer of high class poultry products, but also a public benefactor and an honor to his state and country.

ANNUAL REPORT OF THE BOARD

Readers of the Forester desirous of obtaining copies of the Fifth Annual Report of the Board of Commissioners of Agriculture and Forestry should lose no time in forwarding their requests to the Mailing Clerk, P. O. Box 331, Honolulu

*WOMAN'S NATIONAL RIVERS AND HARBORS
CONGRESS.*

During the last month a branch society of the Woman's National Rivers and Harbors Congress has been organized in Honolulu under the vice-president, Mrs. Augustus Knudsen, appointed for this Territory at the National meeting last December in Washington.

The first meeting was called at Governor Frear's under the auspices of the College Club, when addresses were made to a large and representative body of men and women. Such interest was aroused that at the close of the meeting over fifty headed a membership list for the islands, that has been steadily growing.

The subject of Conservation was next taken up by the Teachers' Association, who were addressed by Mr. Ralph Hosmer and Mrs. A. Knudsen. A committee of principals of public and private schools was appointed to bring the matter before the whole body of teachers, that they might consider methods most effective for the schools.

On invitation of Mr. Wood, Mrs. Augustus Knudsen addressed the students of the Normal School, and the pupils of grade eight from the Central Grammar School.

Their interest and enthusiasm were expressed by the organization of a Normal School Conservation Club, which is an auspicious beginning of a campaign of education through the schools of the Territory.

For the more efficient organization of the Territorial work Mrs. Knudsen has appointed two large committees, on Education and on Publicity, with Mrs. Harmon Hendrick and Mrs. Philip L. Weaver as chairmen. Chairmen are also being appointed on the other islands; Mrs. John Scott on Hawaii has charge of the Publicity work, and Miss Josephine Deyo is arousing the interest of the schools as chairman of the Education committee. Mrs. George P. Cooke is in charge of both departments for the island of Molokai.

Interest in the movement is growing. The first club to join the Woman's National Rivers and Harbors Congress is the Kumuwela Camping Club, composed of thirteen teachers, whose members spend their summer in camp in the forests of these islands. The Normal School Conservation Club has joined as an organization, and also the Daughters of the American Revolution; one hundred and eight individual members are now enrolled bringing the total membership in Honolulu up to two hundred and thirty-two.

The first regular meeting of the members here was held on the 31st of March at the Pleasanton, Mrs. Augustus Knudsen presided. The meeting was addressed by Mrs. W. W. Hall, regent of the Aloha Chapter of the Daughters of the American

Revolution; by Miss Lula Law, president of the Normal School Conservation Club; Miss Minnie Reed, of the Kumu-wela Club; Mrs. F. M. Swanzy and Mrs. W. F. Frear. Arrangements have been made for meetings of the branch society every three months. Accounts of these papers will be found elsewhere in this number.

On Hawaii Mrs. John Scott has held a first meeting at her home, with over fifty ladies in attendance. The public spirit aroused resulted in the enrollment of thirty-six new members of the organization.

GUINEA PIGS AND RATS.

I used to lose a lot of young rabbits from rats—the partly eaten bodies were seen around. I was told that if I kept guinea pigs I would scare away the rats. I bought a pair and put them in the rabbitry, and since then I have not lost one. There are rats in my house as my papers show, and the cats catch them for their kittens, but they have not troubled the rabbits since I put the guinea pigs among them. Rats are timid creatures and so are guinea pigs, and it may be that the restless movement of the guinea pigs scares off the rats; or it may be, as I am told by people, it is the smell of the guinea pigs that rats object to. It is a matter I don't understand, but the fact remains.—Rev. Walter Evelyn, Whitehall, Duncans.

PRIZE CONSERVATION ESSAY.

Prizes have been offered by the Daughters of the American Revolution to the students of the McKinley High School and of Oahu College for the best essays upon "Conservation." It is to be hoped that a wide response will be made to this offer which should materially assist in bringing the attention of those about to take part in life's activities to a subject of paramount importance to our National and Territorial welfare.

IMPORTATION OF COTTON SEED.

Prospective cotton growers would do well to obtain their seed through the Hawaii Experiment Station or from other local sources, as the danger of importing the boll weevil renders it necessary to subject imported seed to rigorous fumigation. By taking the precaution suggested above, cotton importers will not only be spared inconvenience and delay, but will also be safeguarding the future of an industry which at present is very promising.

THE SPIRIT OF CONSERVATION IN THE HOME.

BY MARY DILLINGHAM FREAR.

The opening lines of Bryant's *Thanatopsis* become familiar to us as children: "To him who in the love of nature holds communion with her visible forms, she speaks a various language"; but it is not until we reach mature years that we realize how subtly the variousness of her language depends upon individual interpretation. To the superstitious, and to the scientific mind, nature's voice in the thunder storm brings an entirely different message. To the one the tones of an angry god, heard in terror, must be answered by the ringing of bells to propitiate the spirit of punishment; to the other, this evidence of an electric storm has, in nine times out of ten, been looked for and the time of its coming measured with nice calculation. So, too, any appreciation of Nature's economy is dependent upon the understanding mind. We speak of the ruthlessness of nature, of the destructiveness of nature, of the warring forces of nature, and often fail to see law and order in what seems elemental chaos. But coming into a knowledge of nature's method of housekeeping, observing the fact that nothing is wasted, that the prodigality of the oak as it strews the hillside, or the lake it overhangs, with seemingly wasted pollen thus furnishes nourishment to a horde of insects, or adds to the forest loam or the silt of the lake; that the rivers flow into the sea whence rise the clouds that let fall the rain; that denuded forest and rain-ravaged hill ultimately become star-dust of which new worlds are made—coming into such a knowledge we may well cry out "it is too wonderful for me, I can not attain unto it." Let Nature alone and man's existence on this little planet seems of slight import in the building of worlds upon worlds.

But we come in from under the dome of the universe, in under the roof that man has built and face the fact that man as a mental and moral force has entered the cosmos and, to be himself, must play his part with the titanic elements. Fire, earth and water become a part of his life scheme. Moral life demands self-preservation, preservation of the race, and so long as he exists nature must reckon with man.

Recent study and investigation have shown us how nature, both by the inter-play of her elements and by the constant demand upon her by man, is being depleted as respects her lasting value to the race. In answer to the hue and cry raised concerning this discovery comes the word *Conservation*. It is indeed the word of the hour. When the ship is found to be leaking all hands turn to to find and stop the leak. When the exchequer is low economy must be observed.

Now, if conservation is to mean anything at all it must imply concerted action. To have concerted action there must be

concerted thought, or that magic power known as public opinion. But public opinion does not spring from the head of a god in full armour as did Athena, it is rather a giant that is first cradled as a helpless infant—the right idea in the minds of a few. Where is this infant to be born, but in the homes of each and all of us to be nourished as we nourish our children and to grow with them to full power? Finally, we come to the conviction that the woman in the household, the mother of the family, is to do or is to shirk a great duty in the development of public opinion. Moreover, did she but realize it she holds in her hands wonderful possibilities as an actual conservator of natural resources.

Let us turn our attention to the duties and the opportunities of the mother of a family in this regard. See her, by studying the drafts in the stove, make each stick of fuel give its full value of heat; break off the faded rose and plant the stem; carefully guard the eggs for a setting; prune or bud the orange tree; shield one plant from wind another from overdoses of water, another from drought; trim the tree of too dense growth that the sun may sweeten the pasture beneath it; gather the fallen pods of the samang as fertilizer for flowers and the beans of the Algaroba as fodder for animals; as carefully prevent water from running to waste as she would prevent a destructive fire. If water, replenished soil, and forests are natural resources of how much greater value, she reasons, is the vital force of the sentient being. Hand in hand with the moral value of kindness, she discovers, is the efficacy of protecting animal life. Proper feeding and care of domestic animals bring their reward in prolonged and effective service.

But in all these directions the mother of a family is performing a small task when we consider her work as a guardian and promoter of health. Compared with the conservation of river and forest the maintenance of public health is of incalculably greater value. This in substance has been the reiterated statement of Theodore Roosevelt echoed over the country by public speaker and public press. To how great a degree the public health is in the hands of the mothers of families it is impossible to say, but if there were general intelligence and wisdom in dealing with daily and hourly conditions of children from birth to adult years how vastly different would be this world of ours. Let no woman belittle the details of her task. It is so easy to grow "weary in well doing" in the supervision of the teeth, the skin, and the eyes, the proper diet, and manner of eating (ask Chittenden and Horace Fletcher), the method of breathing and the supply of pure air, baths, exercise, rest and sleep of a large family. To be sure that there is no eyestrain, that the fashionable adenoid does not insidiously damage hearing, that a "growing pain" is not incipient rheumatism, that a "stomach ache" is not an

attack of appendicitis, that in the years of rapid growth no curvature of the spine is developing, that "only a cold" is not dealing an assassin blow at some vital organ, is and has been enough to worry many a mother into an untimely grave. Browning's gruesome tale "Ivan Ivanovitch"—the record of the mother who failed—may be a needed warning to those who, like poor Louche, could say "Perhaps my hands relaxed their grasp—got tangled—God, he was gone!" but too many women suffer and let suffering come from overstrain. In the effort to conserve the well being of the family health in every particular they beggar their own vitality and through actual nervous breakdown or through over-anxiety, expressed perhaps in nagging, foreboding, irritableness or other forms of worry, rob the home of the peaceful atmosphere most conducive to growth and health. The new-thought movement with its positive assertions of good, and its calm optimism is helping many a household to a rhythmic harmony of living conditions which is most essential to the development of the best vitality.

After all, our greatest means of assisting in the world's conservation is not in the doing of tasks, in the actual practice of domestic and therepeutic economy but rather in the educative value of holding for ourselves and creating in those about us the right attitude of mind. We are too familiar with the phrase "what we think we are" fully to realize its best significance. Acts are the expressions of ideas. Too often our acts, well intended, it may be, are ineffective because the desultory expression of desultory ideas. To think deeply and clearly, to begin to see into the great scheme of things, to try to "think God's thoughts after Him" is to gain cohesion,—cohesion with the law and order of the universe. The humdrum task, the oft repeated detail of household duty becomes fraught with meaning and relieved of pettiness when viewed in the cosmic light. Moving in a sense of essential values our unconscious educative influence may be greater than the "line upon line" we consciously try to teach. Children growing up in an atmosphere pure, large and free, mentally and spiritually as well as physically, will go into the world equipped with right ideas of conserving earth's products and reinforcing human power. Acts for inspection of foods, filtration systems for drinking water, fresh air farms, pure milk depots for infants, regulation of hours and working conditions in factories, building regulations for tenements, parks and play-grounds, advancement in surgery, war to the death against cholera, yellow fever, plague and tuberculosis, and temperance reform are what but the fruits of the spirit—in other words, the result of public opinion?

Let us live and work to greater ends yet, doing the little necessary tasks in the large sense that they are necessary, and in our largeness of spirit seeing that no least duty is undone.

SOME SUGGESTIONS FROM THE KUMUWELA CLUB.

BY MISS MINNIE REED.

Probably your first question is,—“What is the Kumuwela Club?” Let me introduce this baby club of a few months to you elder sisters. We are a few teachers who love the out of doors and camping sufficiently to rough it and live “The Simple Life” for a few weeks of our summer vacation. All teachers feel the need of a change of climate after the year’s work, but few of us feel that we can afford to go to the States every year or two for this change. Therefore, if we camp at a higher altitude we have both the rest and change of climate at a very small expense.

The idea of an inexpensive outing for teachers and a plan for the organization of a permanent club for this purpose originated in the mind of Mr. Augustus Knudsen. It was Mr. and Mrs. Knudsen who made our first outing, and the organization, a delightful reality. Mr. Knudsen invited us to camp on his ranch in the mountains of Kauai and selected the place for the camp, had trails cut, bushes cleared off, pitched our tents, selected and ordered our provisions and camp utensils; and also secured our horses and pack animals for the 20-mile ride. In fact, Mr. and Mrs. Knudsen were our guardian angels all the while we camped.

Our camp was equipped with two 14x16 tents and a 12x20 foot fly for kitchen, dining room and reception hall. We were also provided with a large wire-screened safe for meats and provisions, granite ware plates and cups, knives and forks, dutch oven, frying pan, etc., for twelve people. Several large stones formed our fire place and bars of iron served as supports for cooking dishes. Plenty of dead brush and trees around camp furnished us with fuel; while a clear, clean brook a few steps away gave us drinking water. A rod or so below the camp was a pool for bathing and washing.

Our camp was located at about 4000 feet elevation on Kokee Creek in a little forest basin called Kumuwela, meaning “place of fire.” The camp was opened for two months and 14 persons were there at intervals. The temperature was cool enough for sweaters morning and evening and for two heavy blankets at night.

Our club members camped from two to six weeks at the cost of \$20.00 to \$30.00 apiece, including steamer fare, food, riding horses, pack animals, etc. Every club member gained in strength and mental poise and came back refreshed in body and spirit, ready for the year’s teaching. Each one brought back delightful memories of the mountains, and forests, a renewed enthusiasm for the out-door life, and richer for the new friends and comrades made in camp.

Let me draw for you a little pen picture of Waimea Canon and of Kumuwela Camp so that you also may enjoy their

beauty and understand our enthusiasm for this outing.

After a delightfully smooth trip on the Kinau, we mounted the horses that waited for us at Waimea wharf and started on our 20-mile ride to the mountains. We wound along through the lovely Waimea valley, with its green rice fields and taro patches, following the quiet river, which mirrored the mango trees along its edges. Here and there were cottages with groups of coconuts, while on each side were the almost perpendicular walls of red-brown lava, which, in the distance, seemed to touch each other and merge into the purple haze of the mountains beyond.

At last our road changed to a trail. We moved on in Indian file up the narrowing cañon until finally we came to a zigzag path leading up the steep cañon wall to the grassy plateau above. Here we paused a few moments to rest our horses, then on and up climbed our sure-footed beasts, winding about boulders, between bushes, and over stones until at last we arrived safely at the top.

As we rested we looked down the precipitous wall and wondered how the beasts had scaled it, and understood why our amateur riders had clung so tightly to their saddle pommels and heaved such sighs of relief when we arrived on the plateau. Far below was the smiling valley between the frowning cañon walls, and on the other side were miles and miles of pale green cane rolling in gentle swells to the sea.

Then on and on we rode, winding across the grassy plateau, over hills and steep gulleys, past scattered groups of fine old koas, steadily climbing upward until we paused for another rest near the edge of the cañon, where we had a fine view of Waipio Falls leaping over the great rock hundreds of feet below. Here the cañon walls and the higher mountains have the most wonderful violet color, shading into purple, making a beautiful setting for the falls.

A few more miles were climbed, and again we rested near the cañon's brink, where we looked down nearly 2000 feet into the blue depths. Then we lifted our eyes toward the head of this wonderful gorge, carved from the red and brown lava by the rains of many ages. The western sun had glorified the sculptured towers and columns of the cañon wall until they were all alive with color, making vivid contrasts with the great purple shadows.

It was here that Mr. Hitchcock painted his fine picture of Waimea Cañon. If you have seen this picture you may have some faint idea of the marvelous coloring and depth of this gorge, but neither words nor pictures can more than suggest the reality.

Very soon Mr. Knudsen met our party with a cheery "Halloo" of welcome and led us to Halemanu cottage. Here we rested a few moments out of our saddles, had a cool drink, then journeyed on across mountain meadows, over steep ridges,

through forests and across mountain streams, until at last we rode down into the wooded basin where we caught the first glimpse of our tents half hidden under the tall lehuas. It was about sunset, and a camp fire was burning under a hot supper, all ready for the tired, hungry riders. Three of our Kumuwela Club had come up to camp ten days earlier, so everything was in order when we arrived.

Here were the three tents overshadowed by the great lehuas, still brilliant with their cardinal blossoms. No lovelier, more secluded, or restful spot could have been found for a vacation camp.

All about the tents were ferns, while the fragrant maile trailed from every tree and bush, and beautiful mosses and lichens covered the tree trunks and stones. Down behind the tents ran a clear mountain stream between fern covered banks. A narrow, winding path led to a small drinking pool near a great moss-covered boulder. Here we often rested in the cool shadows to watch the mirrored picture of blue sky, shining between overhanging branches and tall ferns. As we returned with dripping pail we had lovely glimpses of the tall trees, tangled ferns and the stately Lobelias standing like great green kahilis along the banks. A few rods below, under a sheltering cliff, hidden by ferns and vines, was the bathing pool where we took our early morning dip, sometimes startling the lonely wood duck into hurried flight. Here we loved to sit on sunny mornings and watch the bright colored dragon flies skimming over the pool and the shrimps playing at hide and seek among the pebbles, or listen to the sweet notes of the Elepaio and Akakani, two native song birds. Near this pool we found land shells ornamented with delicate golden tracery, while in the stream below were beautiful water mosses and algae. Still further down the stream is a deeper swimming pool just below the cascades, where the overhanging bank is covered with maidenhair fern, pink begonia and dripping mosses.

All about our camp were poha berries and nice juicy lilikois, (a kind of water lemon). On the encircling ridges were fragrant mokihana berries, which we strung into leis for friends at home.

On cool, clear nights we gathered about the camp fire, lying on our blankets, looking up through the branches at the stars, singing college songs or telling stories of pranks and experiences in colleges from Nova Scotia to California.

At last, tired and sleepy, we went to our tents to slumber on our beds of fragrant fern until wakened by the early song birds or the crowing of the wild cocks. Sometimes these cocks called up the Nimrod campers, who shouldered the rifle and stalked the wary chickens before sunrise, going far up the cañon and over the ridges through wet grass and tangled bushes. The hunters returned with shining eyes and glowing

cheeks, and with a big appetite for breakfast, but no chicken for dinner.

The only victim shot by the Kumuwela campers was a huge wood rat that persistently stole camp provisions, and disturbed our dreams. He was executed by a single bullet about sunset, so we slept in peace thereafter.

Thus we spent the summer, tramping, lounging, reading, writing letters, swimming, botanizing and visiting our neighboring cottagers and campers.

The best of all our experiences were the long tramps over mountain trails through the forests to see the finest scenery in Hawaii. None of the Kumuwela Club will ever forget the wonderful views of Waimea Cañon seen at mid-day, at sunset and by moonlight; from Echo Rock, Waipio Falls and Lookout Point. Also will we remember beautiful glimpses of blue sky, and bluer sea, of forest glade, mountain streams, cascades and waterfalls, gnarled old koas, tangled ferns and fragrant maile.

The most wonderful and beautiful sight of all was Kalalau gulch. No description could do it justice or even give a faint idea of its marvelous beauty and color. I have seen nothing on the Hawaiian Islands that compares with it on a clear morning. None of our party could forget that first view, as we stood absolutely silent, looking over the rim, too much absorbed in its beauty to speak. We looked down 2000 feet below us into the violet depths, just catching a glimpse of green trees; then across to the furrowed emerald walls which looked like velvet curtains hung from the sharp ridges above. Here and there loomed a slim spire or sharp peak thrust into the blue sky, which blended with the bluer sea beyond. Only the white caps and the surf revealed the horizon line and showed us where the sculptured cañon wall opened to the sea. Through the haze we caught a glimpse of shining beach, and a few grass houses with their taro patches behind.

The centuries of rain and wind have carved the brown lava rocks into queer figures, towers and needle-like columns which stand out boldly along the cañon walls and next to the sea, like monuments of some heroic past.

As we stood looking, the fog began floating in, first like a filmy white veil catching here and there on the sharp points; then blowing free and floating into the cañon. Finally, great clouds of fog came in, rolling over in great billows and filling the gulch full to the rim, hiding all but the sharp peaks along the upper edges; and we seemed to be standing on the edge of a stormy sea.

We climbed out on the cañon wall on the ridge towards the sea, where we had a fine view of the rugged north coast with its great rocky peaks rising perpendicularly from the edge of the breakers.

The cañon walls are almost bare, here, or but sparsely cov-

ered with dead and dying trees. Farther up towards the head of the cañon the forest is more dense, and the undergrowth thicker, probably because of the heavier rains and more precipitous walls which keep the goats from climbing about and nibbling.

The ravages of the goats show very plainly on the outer cañon, where there are many trees skinned or scarred, and injured, so that they are fast dying; while all the undergrowth and young trees are entirely destroyed. While walking along this ridge above the dead trees we counted a flock of a hundred goats climbing down the steep trail towards the bottom. There is no forest on the walls or in Waimea cañon or at the head of the gorge; and the slopes above are thinly forested. This is partly due to the hundreds of goats which are in the upper cañon. Wild cattle and goats have destroyed nearly all of the young sandal wood and kauwila, much of the koa, lehua and other trees and shrubs all through the upper cañons and on the higher plateau. Of course, the Waimea side is drier, so naturally it would have less forest; but it would certainly have more, if the goats and cattle were exterminated. Probably the wild pigs also destroy some of the young trees and undergrowth, as we noticed large areas where they had uprooted all the undergrowth. On our tramps we noticed many koas much eaten by insects, and others attacked by borers, while still others seemed badly blighted by some fungus disease. No doubt the injured and weakened trees are the ones usually attacked by insect enemies and disease; so that the cattle and goats are probably largely responsible for most of the damage. However, investigation of the insects that are injurious to our native forests ought to be carefully made; (and also the tree diseases should be studied), so that if possible some practical remedies might be applied.

What is true of Kauai is true also of Oahu, Molokai, Maui and Hawaii. There are hundreds of fine old dead koas on the slopes of Haleakala and on the sides of Hualalai and Mauna Kea. Most of them have been killed by cattle, or by sheep and goats. The sandal wood and kauwila are rapidly disappearing from every island where cattle range through the forests.

Now, what can be done to prevent this destruction? Naturally, the goats and wild cattle must be exterminated from the upper forests at the head of the water supply and these regions should be fenced away from cattle and sheep ranges just as soon as possible; and very soon the government should make large forest reserves about the head of every stream that is a water supply. All of these things have been recommended for some time by our able forester, Mr. Hosmer, and much has been done; yet very much more needs to be done, and as soon as possible. Mr. Knudsen has been doing the work of forester without salary for some years

merely because he is a true lover of nature and sees the great need for immediate action. Last summer he invited two different parties of young boys to spend their vacation in the mountains and he furnished them with ammunition to shoot the goats. Six Punahou boys camped some three miles from Kumuwela, farther up into the mountains; and shot goats from morning until night. They climbed up and down the steep cañon walls in baseball shoes to follow the goats to their hiding places. They shot 150 goats, several pigs and a few chickens. Most of the wild cattle in this region are now killed, as we saw none on any of our tramps.

We hope that the Legislature will soon pass a sufficiently large appropriation to provide for enough foresters to protect the trees on every island.

SUGGESTIONS FROM KUMUWELA CLUB.

1.—The Kumuwela Club suggests that public camping places or parks be established on every island. These camping places should have some rough sheds or cottages where people would be protected from the weather. There should be a responsible caretaker and a small fee be paid for the use of the camp. This would make it easy for parties of people to go camping in the mountains very cheaply; and it would increase the appreciation of our youth for the forests and mountains, and for simple, healthful pleasures.

2.—We suggest that the recommendation of Mr. Van Dine, the federal entomologist, in regard to introducing insectivorous perching birds, after they have been studied in an aviary, be seriously considered. His recommendation was that certain birds that would protect cattle and sheep from injurious flies should be imported from California, where they are native. The perching birds are all insect feeders, and harmless, except for the few useful insects that they eat. Many of the perching birds are charming songsters, and they would add very greatly to the attractiveness of our gardens, parks and forests. Numerous song birds would double the joys of camping and tramping in the forest. Why not have them in Honolulu and on Tantalus? Here is a chance for the Promotion Committee to add to our attractions. From an economic standpoint we might find these insectivorous birds of great value in destroying many of our insect pests in gardens, fields, and forests, and save the gardeners and farmers much loss and expense.

To make sure that no bird nuisances be imported, it would be wise to follow Mr. W. A. Bryan's suggestion to establish a large introduction aviary and carefully study each bird's food habits before they are freed. Several difficulties stand in the way of the introduction of these birds. First, they are hard to catch in large enough numbers for the experiment; second,

they are very hard to feed artificially, as they must have live insects for food; third, where is the money to pay the expense of the ornithologist for collecting, caring for, and studying these birds in the aviary?

All of these difficulties are probably surmountable if we have the enthusiasm and energy to arouse a strong public sentiment in favor of this project. Is it not really worthy trying? Have we not been benefitted by the birds introduced by Hillebrand, Janion and others?—except, perhaps, the sparrow, which is something of a nuisance. The Mynah has his faults, also, yet he undoubtedly devours many injurious insects that would eat our garden crops. Certainly the sky lark, the linnet, and the mourning dove have all added much pleasure to our rides and walks. The wild turkeys, pheasants and the California quail have all furnished sport for the hunter and game for the table.

3.—We suggest to whoever owns or leases land for a number of years that he plant trees in the stoney places and small corners and plots not suitable for cultivation, and along the highways where it is possible. Also that the owners of small homes learn to plant better trees and to plant them more artistically or effectively so that they will add beauty to the whole landscape.

4.—That all teachers try to arouse a greater love for trees and tree planting among the children and their parents, and that when school grounds are laid out care and taste be employed in selecting the best possible trees for particular localities.

5.—That we as a club, and as individuals, try to arouse a greater love for nature, especially for the mountains and forests; and the simple, healthful joys of camping.

6.—That we recommend camping vacation schools to be organized for boys and girls of high school age, similar to those established in the Maine woods and other Eastern localities. That groups of ten to twenty boys or girls be organized with a reliable matron and teacher in charge, and that they rest, tramp, lounge, swim and stay up in the high altitudes as much of the vacation as possible, living on simple, wholesome food. The teacher in charge should be a naturalist and botanist and teach the young people some of the things about plants, trees, insects and birds, that would always add a keener joy to every walk and ride.

7.—We suggest that every one who owns mountain lands or camps in the mountains consult Mr. Hosmer and read the bulletins about tree planting, then secure seeds and young trees and plant them wherever there is vacant space.

8.—We suggest that more people plant the rarer fruits like the mangosteen, cherimoya, litchi, chutney mango, etc. in their gardens, and plant ornamental trees and fruits along

the public roads for the pleasure of travelers, as is done in certain parts of Europe.

9.—Last, but not least, we suggest that a special camp be established in the mountains of Kona particularly for those young boys and girls who are threatened with or in the first stages of tuberculosis; that this camp be permanent, and comfortable, and in charge of competent people, and that instruction and amusement, as well as out-door work be provided for these unfortunate children so that they may grow well and strong, if possible, and at the same time have some kind of training for their future usefulness and self-support. If we are going to conserve our natural resources, we must look out and plan wisely for the children, for they are the greatest resource for the future republic. Whatever trains or protects the children more effectively adds most to our future greatness.

FOREST RESOURCES OF THE UNITED STATES.

The forests of the United States now cover about 550 million acres, or about one-fourth of the land of the whole country. The original forests covered not less than 850 million acres, or nearly one-half.

The forests owned by the government cover one-fourth of the total forest area, and contain one-fifth of all timber standing. Forests privately owned cover three-fourths of the area, and contain four-fifths of the standing timber. Besides having three times the area and four times the forests, the timberland privately owned is generally more valuable.

Forestry, or conservative lumbering, is practiced on 70 per cent. of the forests publicly owned and on less than one per cent. of the forests privately owned. This covers the country's forest resources as they stand today. Senator Smoot, chairman of the section of forests of the National Conservation Commission, in outlining the future has said:

"By reasonable thrift, we can produce a constant timber supply beyond our present need, and with it conserve the usefulness of our streams for irrigation, water supply, navigation, and power.

"Under right management, our forests will yield over four times as much as now. We can reduce waste in the woods and in the mill at least one-third, with present as well as future profit. We can perpetuate the naval stores industry. Preservative treatment will reduce by one-fifth the quantity of timber used in the water or in the ground. We can practically stop forest fires at a total yearly cost of one-fifth the value of the standing timber burned each year, not counting young growth.

"We shall suffer for timber to meet our needs, until our forests have had time to grow again. But if we act vigorously and at once, we shall escape permanent timber scarcity."

THE NEED OF PRACTICAL ACTIVITY.

BY AUGUSTUS F. KNUDSEN.

It is time that the forest reserves laid out on paper are actually taken care of and really put in a position to recover and increase. Enough has been said by the men who know; by Mr. Hosmer, our Forester, and others to show what has been done for our forests, in the last few years, and why a forest is of value in protecting the rivers, to catch the attention of and convince the general public that something must be done. Some wish to go more deeply into the matter, understand what the local forest area was, what it is, and where the localities are situated that require prompt attention.

STOPPING THE WASTE.

It is well to remember that the Land Commissioner and the Superintendent of Public Works need the backing of an enlightened public opinion if they are to properly enforce the spirit of the long Government leases against the wanton waste of the forests on Government leased land. A large number of watersheds on each and every island are leased as a whole to private parties. On these the wild cattle, which are practically worthless, are allowed to destroy the forests and irreparable damage will be done before the leases expire. The presence of these cattle is unwarranted; they bring no income to the lessees, in fact, they jeopardize the incomes from the water-rights. But somehow it seems impossible to get anyone to defray the expense of exterminating them, and the expense of building fences which will prevent the tame cattle on lower levels going wild again.

Cattle become wild very soon when they get into the forests where herding and driving are impossible. The question of the devastation done by wild goats is almost as great a one. They, too, are a menace to the usefulness of the streams and especially to the steeper mountain sides in the dry districts. The vegetation being removed the soil is washed off and the valleys below filled up, the stream beds choked by the masses of boulders and gravel that fall down as soon as the binding sod is removed.

On Kauai the harbor of Waimea has been almost ruined by the silting up of the bay. This silt comes from the cañon walls, and only since the disappearance of the forest. Prior to the inroads of the goats the floods were clear—clean water only flowed off from the wooded and grassy slopes.

"Since the coming of the white man, have our floods turned red," said an old inhabitant of upper Waimea in 1886. An unconscious sarcasm on the wastefulness and short-sighted policy of the white man's way of doing business.

OLD FOREST LINES.

The forests of old, the forest line of the time before the cattle began their depredations, came far down the mountain. In fact, all the upper cane fields of Hanalei, Kilauea, Kealia, Lihue, Koloa, McBryde and Makaweli plantations on Kauai and also the upper fields of Waialua, Oahu, and Honolulu plantations on Oahu, lie within the old forest areas. In the wetter districts it came nearer the sea level. In the drier districts it receded to the neighborhood of the 500-foot level.

All the pastures and open lands, now called the Pineapple Lands, that lie between the cane and the forests that are now standing were formerly primeval forest, not perhaps continuous, but all that nature could devise. Soil conditions, cultivated areas would make a gap here or there, but in general it was a close and dense, if not very high, growth of trees, shrubs and creepers. Many varieties of these are now almost extinct.

The whole of the valleys back of Honolulu were wooded and the greater part of the treeless tracts on the Koolau side of Oahu as well. The forest is now but a remnant of what it used to be, as can be seen today on the slopes of Nuuanu and Manoa valleys. The same can be said of Maui, and to some extent of Hawaii. Hawaii, having large areas in which no stream has yet come to life, has a distinct problem from that on the other islands.

Now the forests are driven back to their last strongholds. Only where it is too steep for cattle and only where the goats have not yet come in is there any primeval forest. The goat hates the wet districts, so he began in the driest parts. By clearing out everything he seems to be pushing the wet district back. When he gets to the point of starvation he runs over the top of the mountain or down to the valley bottom and carries his depredation into the domain of the cattle, be they tame or wild.

Goats now can be found on Kauai in the forests back of Kapaa and Wailua, at the head of Hanapepe, all round the Waimea system from Olokele to the western side of the canyon, and in every valley from Kekaha to Kalalau of the west coast and Napali region.

In every one of these watersheds there are more or less cattle, of no value to anyone, doing their best to make their ideal of an open treeless tract to live in. There are few people who know how much land one cow will keep bare of trees, for they are not able to observe and study the matter.

PRESENT POLICIES.

Somewhere between the agriculture on the one side and the inaccessible mountains on the other lies the happy medium,

the line above which it is not practical to graze cattle at a profit and below which it is possible to herd, control and manage cattle in a civilized way. At that point the force of public opinion, expressed in law written or unwritten, should step in. Fences should be made at the nearest accessible points, where the distance to be fenced is shortest; where natural barriers help to make it inexpensive; where the fences can be built for the least cost of getting the material on to the ground. Every cattle ranch owner can tell just where the cattle can be controlled, and at which point they become unmanageable, half wild and, if properly figured out, unprofitable. At that line a fence should be built and the land beyond devoted to forestry. As it is the cattle only feed on a small part of this rough wild region. The forest clings tenaciously and will revive immediately on being protected. The seeds are still in the ground, all they need is a chance to grow.

The experience of any practical cattle man is that the income to the various land holders, from the wild and semi-wild cattle, beyond the proposed fence line is a minus quantity. It is too small to be figured out, or it is less than the value of the forest as forest, and the water derived from the forest would be. The cattle within this proposed fence line are only a small fraction of the total cattle of the country. On some forests of vast economical importance there is no pretence even that the cattle are a profit to the owners.

SUGGESTIONS FOR POLICY.

The government should formulate and announce a policy along these lines. The first thing is to stop the waste of forest growth now going on upon the government leased lands. Where it is too expensive for the lessee to fence without being crippled, let the government take back its lease, but on the part involved only. Where the fencing would really be a gain to the ranching interests on the balance of the leased land or on the contiguous private lands, force the lessee to fence at his own expense at the point of least expense and greatest public good. Thus preventing loss through more tame cattle going wild.

All that is embodied in the provisions of the government leases against "waste and bad husbandry," should be enforced. All it needs is a cool and determined, unbiased official to carry it out. The official must have public opinion back of him, however, and that public opinion must be forcibly expressed. Otherwise the official will be thwarted by the financial power of most of the lessees of large government tracts.

Where private forest lands are naturally an integral part of adjacent and larger government lands, or where a small piece of private land juts into a larger government land the

government should overtake the protection of the whole, rather than compel long and expensive fencing for small forest areas. Complications like that arise where the watershed is the boundary *de jure*, but the cliffs of the neighboring canyon, forming a natural boundary, could be used with practically no expense as the fence line to keep out cattle.

Where the public and several private ownerships and conflicting water rights are involved in the same drainage area the government might also step in and overtake the protection of the joint water supply and its equable distribution to the claimants. This is already being done by the Reclamation Service in several instances on the mainland.

RESTORATION.

The effort for restoration of forests need not involve any expensive tree planting. In all the watersheds, at least on Kauai and Oahu, that are of value for water-conservation the natural forest is struggling to restore itself if only the causes of devastation were removed.

Go into any struggling forest in the early summer, and even the casual observer will find hundreds of seedlings of even the larger trees springing up. Koa, Ohia, Kopiko, Kauila, everywhere a few in between the weeds and grasses. In the fall, after the dry weather, when they should be six or eight inches high, they are gone, bitten off or pulled up by the browsing cattle and goats. After the seed crops are used up it will be too late to save anything. Cattle and goats are really the only enemies the forests of Hawaii have. Kill them off and prevent their return, and in ten years you cannot recognize the region again; in twenty years the forest is practically restored, though young. Insect pests only seem to follow where natural conditions have been entirely upset by grazing herds.

Since, however, the areas involved are large and cover dozens of adjacent ownerships which cannot readily be brought to work in harmony the government should undertake the whole matter. Systematic scientific work only will succeed, continuous work only will win out. This the government alone is in a position to undertake, and carry on without mutual jealousies and ill-feeling. For instance, the Koolau range from Moanalua to Waimea and Kahuku is still in jeopardy from wild cattle. There are not many, there are enough, however, to prevent further new growth. The cattle wander from one ranch to the next. If they are hunted, let us say, in Waipio they run east or west over the boundary. There they are safe till some spasmodic effort is made by the neighbors and then back they come.

To exterminate these useless cattle quickly it would be nec-

essary to follow them up continuously, even ruthlessly, and of course without regard to boundary lines. A few good mountaineers could finish this work in about six months if the forest was so fenced that no more cattle could wander in to replenish the stock.

The public owns two splendid forests in the Koolau range, the Waianae-uka and the Kaipapau forest reserves. There are at least a dozen ownerships involved here besides the government. Surely in cases like this it is up to the government to undertake and carry out the work of extermination.

An example of the policy for fencing on the lines of least expense can be had in the district of Waimea, Kauai. Here a large area of forest land lies between the Olokele valley and the Koaie canyon. Both these canyons are natural barriers, and cattle cannot cross them. There are no tame cattle now on or near this forest land. Yet it is full of wild cattle and the dense forest constantly receding. The only practical access to the forest land, the road over which the cattle traveled to enter the forests in the first place, is over the government land of Mokihana.

The actual forest is about thirty square miles, of which only four or five at most are on private land. The boundary runs inland through rough, boggy, inaccessible country for all of eight miles. Would it ever be practical or business like to maintain a fence line under these most expensive circumstances for the sake of a small area, from which the owners make no income from the cattle any how? From this same area come the large Olokele, Kahana, Mokuone, Waialae and Koaie streams. From all of these the water brings in great incomes.

By a concerted action all this area could be protected from further inroads by tame cattle without the expenditure of one cent for fencing. The additional expense to the government of eradicating the cattle on the private land would be hardly appreciable. It would be much less than the proportionate amount of land added. If the public forests of Waimea district are protected now the forest will be on the increase by 1920, when the leases are up. If nothing is done till then the destruction will have gone so far that nothing will restore it naturally. What is the use of having men, like Mr. Newell, visit us, if we are going to supinely waste what can be saved without him. Yes, if we actually waste the resources with which we hope to get the now waste agricultural lands reclaimed from comparative uselessness. The forest land is the only hope of the arid lands below.

BY MRS. ELIZABETH VAN CLEVE HALL.

[Read before the Hawaiian Branch of the Women's National Rivers and Harbors Congress, on March 31, 1909.]

This will be a little sermon made up of short stories; my text is from Romans 14:7: "No man liveth to himself."

When I was a child, yet old enough to remember it all, my father took his family from the beautiful State of Michigan, where I was born, and moved into the equally beautiful State of Minnesota; the land of the "sky-tinted waters," as the Indians call it.

Our home was in the remote interior of the State on what had been an Indian reservation, and there were some sixty houses standing all empty. It was called Long Prairie; and was situated in the heart of the "Big Woods," being one of those natural clearings, or openings, so common in our western forests.

The land had been purchased by a company of capitalists, two of whom were uncles of mine, and, knowing that some of our family were not especially robust in health, it was suggested that we try what the dry air of Minnesota would do for us. Besides my father was especially fond of farm life and this land was ideal for that purpose.

As I have said, the primeval forest lay all about us. The prairie was about ten miles long and from two to three miles wide. A good stream ran through the land and several charming lakes were included in this ten miles. Splendid meadows and rich grazing lands made it a perfect country for stock raising.

We were twenty-eight miles west of the Mississippi; the road was horrible, but the forest magnificent all of that distance. Woods, woods, woods, all the way—and oh, how glorious it was! Then our little prairie and woods again extending, with only small openings, way up to the head waters of the great Mississippi.

We lived there for nearly five years; then the Civil War called my father, who had had a military education, to the front; and we sold our stock and moved to Minneapolis, where we could be in daily telegraphic communication with the army. I have never visited the old home on the prairie since. It is now a thriving town with railways, steamboats on the little river, and is the county seat of Todd County.

When I last visited Minneapolis, I said to one of my brothers, "I do wish I could take time to visit Long Prairie. I have never been there since we moved away. I would like to see the woods again, and to test my memory of old localities."

"The woods," he said, "are very largely cleared away; and you would find it hard to realize where you were."

Think of it! Those splendid forests gone, or nearly so; and we thought they were inexhaustible.

Already the well-wooded States of Michigan, Wisconsin and Minnesota are trembling with anxiety over the diminution of their glorious forests. Lumber has advanced in price till the cost of home building has become a serious question with young men starting in life, and the open wood fire, which we used to enjoy so thoroughly in long winter evenings, has grown to be too great a luxury for the poor man to enjoy, while the loss to the whole land is becoming a matter of serious consideration to which the country is only just wakening.

Again, we had a dear friend and neighbor once in the late Dr. Baldwin, formerly missionary and physician at Lahaina.

I recall many enjoyable conversations with him, he taught me many valuable lessons. I remember once his telling me about the beautiful coconut groves of Lahaina. He said that he once held a conversation with the high chiefess at Lahaina in which he advised her to plant coconuts that the older trees might be replaced as they died out. "What is the use?" said the easy going old lady, "I would never live to eat of the fruit."

"True," said the doctor, "but how about your children?"

The thought of planning and working for posterity was a new one to this excellent lady, but she arose to the occasion and hundreds of coconuts were planted by her command, that year and the beautiful groves north and south of Lahaina stand today as a memorial of the high chiefess Kinau.

One more little story only. Some years ago I was talking with a gentleman of a remarkably heavy rain which we had just experienced, when he said to me, "Mrs. Hall, I don't believe in the accuracy of that rain gauge of Mr. Hall's—why a rainfall like that would lay the Sacramento valley under water; and look at this place, no water standing anywhere!"

"You are undoubtedly right," I replied, "as concerns the Sacramento valley, but will you please consider the difference in the lay of the land. Pouring water from the mountains into that great valley is like pouring water into a huge bowl, while here it is like pouring water upon an inverted bowl—the water runs off into the sea leaving us high and dry." All this tremendous rainfall tumbled into the Pacific ocean, which is well supplied already, and our cattle dying for want of water enough to drink only a few months later; and the land drying up and blowing a way, in spots, at least.

And yet, in upper Nuuanu valley is a great depression which is capable of being made into a series of great reservoirs which

would supply all Honolulu throughout the dryest season, and this is only just beginning to be appreciated. This is only one of many valleys which might be made to conserve a portion of the rainfall and be a great blessing. Some of our planters have done great things in the way of conserving water, redeeming arid lands, and so forth, and this at great cost. The benefit to the whole land cannot be overestimated and we honor them for their foresight and helpfulness. These things will be told as a memorial of them in the years to come.

It is argued that these valley reservoirs are dangerous and the awful Johnstown flood is cited in sounding the note of alarm. And yet they can be made strong and safe if properly constructed.

Our mountains are the natural home of fine trees whose woods have high value commercially; yet some of these have almost wholly disappeared and this because, in our eagerness to be able to tell of our large cattle ranches, we have forgotten to consider the future generations and have allowed the young growth to be destroyed.

Again until lately there has been no limit to the extension of large plantations which border on the forest, and many fine groves have fallen to make way for sugar cane.

Is it wise to cut away the Ohia forests on Hawaii so rapidly? The forests stand between us and desolation. Let us be careful of them.

This subject of building and planning for posterity is worthy of our serious consideration, indeed we cannot afford to neglect it. Preservation of that which we have is less costly than restoration of that which has been wasted and destroyed.

It costs money to build reservoirs, to plant forests and care for them, to fence ranches and all these methods of conservation. On the other hand, it costs money to lose cattle from drought; to have short crops for the same reason, and when health comes into the question, as it surely does, it costs money and lives of men to have pestilence as we may have in long seasons of drought.

In view of the importance of Conservation the Aloha Chapter, D. A. R., has decided to lend a hand in educating the young people to feel the serious need in this line; and it is their intention to offer a prize in the coming year to Oahu College and McKinley High School, each school separately, for the best essay on Conservation, and I am assured by the president of the local Chapter of the Sons of the American Revolution that they are in accord with our plan and ready to coöperate with us.

I am not yet prepared to say what form the prize will take, but it will be worth striving for and there is no doubt that the study of this interesting subject will tend to awaken a lasting

enthusiasm in our young people, and a deeper love for the land than they now realize themselves to be capable of.

Finally "No man liveth to himself." However we live, whether wisely or unwisely, future generations must feel the influence of our living. We must live for our children; for their sakes we must try to save a land on which they can live, work and grow as we have lived, worked and grown, only we hope they will improve upon us.

Do you remember the wail of the prophet Elijah when he was hiding in the mountain cave from the fierce wrath of Jezebei? "Let me die, for I am not better than my fathers!" Not to be better than his fathers seemed to him, apparently, the acme of failure. We will hope that our children will not have to face a calamity so dire.

When the great Creator placed man upon the earth he said, in effect, "Behold I am giving you a great, beautiful world to inherit. I have left it for you to discover and develop its marvelous resources. Go in and possess the land; it shall be to you an heritage and to your children after you. But remember the children; you cannot live for yourself alone, you must pass your work on, and on, and on, till the end of time. And when you rest from your labors, still your works will follow you."

WAGES IN CUBA.

A recent British Consular Report states that the average agricultural wages paid in Cuba are as follows: For a foreman, about £7 12s. 8d. per month; for a laborer (presumably more or less skilled), about 3s. 6d. per day, and for an ordinary "farm hand," about 2s. 11d. per day. The cost of board for a laborer is placed at about 9s. per week.—*The Agricultural News, Barbados.*

CALCIUM CYANAMIDE.

Experiments with the new nitrogenous manure, calcium cyanamide, reported upon in the *Journal of the Board of Agriculture* (Great Britain) lead to the conclusion that "this manure, as now manufactured, can be stored for a reasonable time, under ordinary conditions, without loss of its fertilizing properties, and that the calcium cyanamide can also be mixed with superphosphate, without difficulty or resulting loss."

FOREST PLANTING ON OAHU.

By C. A. BROWN.

At a public hearing of the House Committee on Agriculture and Forestry, Promotion and Immigration, held on March 8, 1909, Mr. C. A. Brown of Honolulu spoke in regard to forest planting now being done by the Ii Estate on the land of Waipio, in the Ewa district, on the island of Oahu, as follows:

The Chairman (Mr. R. W. Shingle): "The committee has two more speakers that we want to hear from. One thing about this bill that appeals to the committee is that the Governor has asked for an appropriation of \$88,000 to maintain the Board of Agriculture and Forestry for the next two years. We find that if this bill could be enacted into law, one-quarter going to the conservation of natural resources and forestry would give us \$150,000, which in a conference with the Governor he agreed that if needs be to meet the current revenues the item which he asked for for the Board of Agriculture and Forestry could be included in this bill. There would have to be some amendments to the bill if it passed that way.

"The committee asked Mr. Brown, who has been doing considerable reforestation on private lands at private expense to come here and explain to the committee what he has done in a short time in the way of reforestation, and the committee would also like to know, Mr. Brown, what would be your idea in the way of reforesting and protecting our forests, out of this appropriation. As I meant to say, the Superintendent of Forestry, Professor Hosmer, has an idea that the best way to look after the forests would be to have employed rangers, so many on Hawaii, so many on Maui, so many on Kauai and so many on Oahu, who would be engaged daily in the work of patrolling the forests, keeping stock out of the forests, preventing fires, etc., and the committee is desirous of knowing what you think of that scheme."

Mr. C. A. Brown: "I can only speak from my own personal knowledge and the work we are doing at Waipio. That is in the district of Ewa. I believe that we were the first people to fence in the forest. That was in 1893, but we have great difficulty in keeping out the wild cattle. There were trails through the mountains from Kalihi clear to Waialua that cattle are continually coming in by. We generally take two trips a year and shoot out the wild cattle. About six years ago I planted quite a number of trees at our mountain house, that has an elevation of about 900 feet, and watched the different trees to see which would do the best. We found that the *Eucalyptus robusta* far exceeded other trees in growth, so on the first of February last year I employed Mr. Willing and his two sons and two Chinese. It took us a little over three

months to establish our nursery and get our plants growing. In about nine months we have planted over 30,000 trees. At first we had to fence the land completely so that the wild cattle couldn't get in. We are planting our trees six feet apart hoping that by planting them so close we will get straight timber and probably in five or six years have to cut out every other tree. I was down there with Mr. Haughs and Mr. Alexander McBryde today. You can go right to the mountain house in an auto. I wanted to show them what we are doing, principally the work we have started off on the lower line of the fence and are working straight into the mountains wherever there is a vacant piece of land where the forest has died. I will say I have watched the forest now for over thirty years and can see great changes, especially by fire. We had a fire only last July in our forest, but it only burned for three days and didn't get any more than a mile. The old trees were destroyed but we find that where those trees were burned down and the vines and grasses were destroyed by the fire that the young Koas are coming up very thick.

"Our work is expensive because we are planting every place, on the hill and everything. We planted 24,000 trees up to the 1st of December and they averaged us \$96 an acre, which is too much, 6 or 8 cents a tree, but the expense is in the elevation and the valleys and hills we have to pack these trees over. We plant all sites. We have some side hills so steep that we have to let the boys down with ropes. These boys hang on with their bare feet on the side hills and plant the trees. My idea is to put in all the country there above the mountain fence with trees, and we believe it is going to be a big industry when the wood alone and will pay us more than our expense. But if we could have level ground, and could well plow the land, cultivate it the same as they do with pineapples, the trees would grow much faster and probably wouldn't cost very much, possibly not over \$48 an acre. I am proposing very soon to go in with another young man and plant 200 acres. We intend to carefully plow the land and cultivate it, so that any good things in the soil will go to the trees and not as it does now to the underbrush and the grass.

"I should say that the idea of having a forester for every district would be a very good one. Of course, we look after our own forests. I have always felt a little hurt towards the government because we fenced off the forest and have protected it and still they tax us for it. I have had one suit going into the Supreme Court of the United States, for the reason that we sell our water to the Oahu Sugar Company and get an income for it, for what we have done in fencing off our land and protecting it. I think this is unjust, but the courts have decided against us and so we have to pay a tax of \$2.50 an acre; we have 5,000 acres of forest land, and thus pay to the govern-

ment \$12,500. This appears unfair. Mr. Willing is employed by our estate to watch the forest as well as for planting it. As far as we are concerned, we don't need a forester in our district. But over in Wahiawa I think two or three years ago there was a very destructive fire in those mountains which destroyed an immense number of trees, but by having people living right there at the entrance of the mountains, we are able to protect our own forest. The time is coming when everybody should plant trees. I have been trying to get the Oahu Sugar Company to commence the work but they haven't got to that point yet. Everybody wants dividends. Well, I think it is a good thing for them to plant trees. In a few years from now they would get a big dividend from the wood. It is getting scarcer.

"As far as forestry goes and also as far as immigration goes, I want to put myself on record as being willing to stand my share of the tax."

A NEW LOCAL NURSERY.

For some time past the want of a reliable home source from which to obtain specimens of choice plants and seed has been felt on the part of our local agriculturists and home gardeners. The establishment of nurseries on Hawaii by Mr. Jared Smith for the propagation of economic and decorative plants will no doubt be welcomed and largely made use of by our island growers.

RECENT LEGISLATIVE ACTS.

This issue of the Forester continues the publication of recent Legislative Acts affecting agricultural interests—all of which measures it will be observed relate in some degree to the conservation movement. With respect to the act providing for the protection of birds beneficial to our island forests it will be noted that the relaxation in favor of scientific workers, of the law which prohibits the destruction of certain species of Hawaiian birds, is withheld in the case of the Laysan waiian goose (Nene). This bird for a period of four years ending March 1, 1913, is absolutely protected from molestation, by the present act, and an opportunity is afforded this interesting species to re-establish itself throughout the islands.

BOARD OF AGRICULTURE AND FORESTRY.

DIVISION OF FORESTRY.

REPORT FOR MARCH.

Honolulu, Hawaii, April 7, 1909.

1 of Commissioners of
Agriculture and Forestry,
Honolulu.

ntlemen: I have the honor to submit the regular report
e Division of Forestry for the month of March, 1909.

INTEREST IN CONSERVATION.

re most notable happening from a forest standpoint dur-
March has been the popular interest that has been aroused
ly in the conservation of natural resources through a
s of public and semi-public meetings that have been held
onsider this important subject.

ollowing the Special Conservation hearing before the Leg-
ure on March 1, and the College Club meeting at the resi-
ce of Governor Frear on March 2, of which mention was
e in the report of this Division for February, there have
a several other meetings of which conservation has been
subject. Most important was the public hearing held be-
the Legislature on March 8, for the discussion of the pro-
ed special income tax to create a fund for assisting immi-
tion and for conservation. Many prominent business men
ke in favor of the bill and there was a unanimous expres-
of opinion as to the necessity for the conservation of the
sts and the wiser use of the streams. This meeting was
arked contrast to the hearing on a proposal to increase the
ritorial revenues through raising the general tax rate, held
e days earlier, when many of the same men who favored
immigration-conservation measure had strongly opposed
increase in the general tax.

On March 8, in company with other speakers, I gave a short
on Conservation before the Teachers' Association, at the
Kinley High School. On March 31 there was a meeting of
local branch of the Women's National Rivers and Harbors
gress, at which several ladies read papers on forest pro-
ion and other conservation topics. Through this organiza-
, and largely as a result of the efforts of Mrs. Augustus
Knudsen of Kekaha, Kauai, a number of local organiza-
s have become affiliated with the conservation movement.
of these new societies is the Conservation Club at the

Normal School. All this activity is cordially to be welcomed for it all helps in building up a strong public sentiment in favor of forest work, without which it is impossible to accomplish all that waits to be done.

REPORT OF CONSERVATION HEARING.

The report of proceedings of the Special Conservation hearing held before the Legislature on March 1, was reprinted both in English and in Hawaiian, and has been generally distributed throughout the Territory; 1500 copies of the English edition and 750 of the Hawaiian having been printed and given out. The report in English also appears in the Hawaiian Forester and Agriculturist for March, 1909. A second printing of the Hawaiian edition is now being made, so that the report may be supplied to persons who have not already got copies. Application for this report should be addressed to the Superintendent of Forestry, Box 331, Honolulu.

LECTURES AT COLLEGE OF HAWAII.

On March 24 and 31, I gave two lectures in the popular course at the College of Hawaii on forest subjects, respectively "The Economics of Forestry" and "Forestry in Hawaii."

FIFTH ANNUAL REPORT OF THE BOARD.

The annual report of the Board of Agriculture and Forestry for the calendar year 1908, was issued on March 11. An edition of 2,500 copies of the full report is printed. About 1500 copies have been given out, locally and to persons on our foreign exchange list.

EXHIBIT FOR SEATTLE EXPOSITION.

From February 11 to March 19, Mr. J. F. Rock, the Botanical Assistant of this Division, was on the island of Kauai, making a collection of logs of Hawaiian woods from which specimen blocks are to be cut for exhibition at Seattle at the Alaska-Yukon-Pacific Exposition. In all logs of 90 different trees, native and introduced, have been got together and are now being prepared for the exhibit.

While on Kauai Mr. Rock also collected 1655 herbarium specimens of native trees and shrubs. It is the intention to send to Seattle four cases of herbarium specimens showing characteristic groups of island plants. The cost of the exhibit is borne by the Hawaii Exposition Commission, out of Federal funds.

BOTANICAL COLLECTION.

side the logs and herbarium specimens, Mr. Rock also collected and brought back from Kauai considerable seed of a dozen Hawaiian plants, mainly trees and shrubs. This is used in our exchange work.

Special acknowledgment should be made here of the courtesies extended to Mr. Rock during this trip by the Knudsen brothers and by Mr. Francis Gay. Without their cordial cooperation the trip would have been impossible.

On March 22 two large herbarium cases, capable of holding about a thousand botanical specimens, were set up in the exchange room. These cases, the work of Mr. Ira Eskew of the Pepee Schools, will be of material assistance to this Division in its botanical investigations.

TREE PLANTING.

The monthly report of Mr. David Haughs, the Forest Nurserman, for March, shows that the number of persons and applications applying to the Government Nursery for forest seedlings continues to increase. The tree most in demand is the Swamp Mahogany (*Eucalyptus robusta*). Within the past few months several thousand Blue Gum trees have been sent to the Government at Molokai. Thirty thousand Ironwoods, started at the Paauhau Plantation, were sent to that company for planting along the top of the cliff. These are only items of the work that is going on regularly, but they show that the Government Nursery continues to be of practical use to the people of the entire Territory.

EXPERIMENTAL GARDEN, MAKIKI.

The work of getting the new experimental garden at Makiki into shape still continues. A cottage and stable have recently been built and one of the laborers now lives on the ground so that he can exercise constant supervision over the garden. The time goes on this garden will become more and more important as a station for propagating plants and as a center for distribution.

VISIT FROM MEMBERS OF THE HOUSE.

As a matter of record it may be noted that the members of the House of Representatives visited the offices of the Division on April 6, inspecting the work of the several divisions and listening to statements in regard thereto from the President of the Board and the Division chiefs.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

BY AUTHORITY.

ACT 66.

AN ACT

TO AMEND SECTION 1 OF ACT 33 OF THE SESSION LAWS OF 1909 ENTITLED
 "AN ACT TO PROMOTE THE CONSERVATION AND DEVELOPMENT OF THE
 NATURAL RESOURCES OF THE TERRITORY THROUGH IMMIGRATION AND
 OTHER MEANS BY IMPOSING A TAX ON INCOMES AND APPROPRIATING
 THE PROCEEDS FOR SUCH PURPOSE."

Be it Enacted by the Legislature of the Territory of Hawaii:

Section 1. Section 1 of said Act 33 of the Session Laws of 1909 is hereby amended by adding thereto the following:

"Provided, however, that such tax shall not be levied or assessed upon money and the value of personal property acquired by gift or inheritance."

Section 2. This Act shall take effect upon its approval.

Approved this 8th day of April, A. D. 1909.

WALTER F. FREAR,
 Governor of the Territory of Hawaii.

ACT 68.

AN ACT

TO AMEND SECTIONS 3, 4 AND 5 OF ACT 104 OF THE SESSION LAWS OF 1907,
 BEING "AN ACT TO PROVIDE FOR THE PROTECTION OF BIRDS BENEFICIAL
 TO THE FORESTS OF THE TERRITORY OF HAWAII, AND TO DEFINE THE
 SAME."

Be it Enacted by the Legislature of the Territory of Hawaii:

Section 1. Sections 3, 4 and 5 of Act 104 of the Session Laws of 1907 are hereby amended so as to read as follows:

"Section 3. It shall be unlawful for any person to catch or kill any *beneficial and perching* bird (or Passerine) other than those specified in Section 2, or to have in his or her possession the body of any such bird, with the intention to destroy the same, or to take, destroy or have in possession the nest or eggs of any such bird.

"Section 4. Any person violating this Act shall be guilty of a misdemeanor and on conviction shall be fined Ten Dollars (\$10.00) for each offense, and Fifty Dollars (\$50.00) for each *beneficial and perching* bird (or Passerine) killed or caught, other than those specified in Section 2, or for each body or part of the body of such bird that he or she has in possession, or for each nest or egg of such bird as is destroyed or possessed in violation of this Act; or shall be liable to imprisonment for two weeks or to both fine and imprisonment at the discretion of the court; provided, however, that the preceding sections of this Act shall not apply to any person holding a permit, issued in accordance with the provisions of the next Section of this Act, giving him or her the right to collect any species of *beneficial and perching* bird (or Passerine), their eggs or nests for scientific purposes only, unless such person shall violate the conditions of such permit.

"Section 5. To any person who shall furnish satisfactory evidence that he or she is a duly authorized agent of some scientific institution and is collecting birds, their nests or eggs, for such institution, or for private scientific study, and not for sale, the Commissioners of Agriculture and Forestry of this Territory, or such agent as they appoint, may issue a permit to collect for such scientific purposes, a limited number of any species of *beneficial and perching* (Passerine) birds, (the number of each and any species that may be caught or killed being stated by the aforesaid Commissioners of Agriculture and Forestry or the agent appointed by them), at any time between and including the first day of October and the last day of February next following, but at no other time whatsoever. Provided that no such permit shall be issued to any person, scientists excepted, to kill, catch, destroy or molest the birds, nests or eggs of Hawaiian goose (Nene) for a period of four years ending March 1,

Section 3. This Act shall take effect upon its approval.

Approved this 8th day of April, A. D. 1909.

WALTER F. FREAR,
 Governor of the Territory of Hawaii.

THE HAWAIIAN FORESTER AGRICULTURIST

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MAY, 1909

No. 5

PRINCIPLES OF PLANT IMPROVEMENT.

By J. W. GILMORE, *President, College of Hawaii.*

The principles of plant improvement are based primarily on the theory of evolution. The theory of evolution, though bitterly opposed and criticised at first, is now practically universally accepted. It recognizes that instead of the spontaneous creation of individuals and groups of living beings, these are the result of constant change and variation in accordance with factors of environment and heredity. That such changes and variations were existant among individuals and groups of living beings was known long before the time of those writers who are usually credited with the discovery and propagation of the theory. But not until about the time of Lamarck (1744-1829) were definite scientific reasons ascribed to the changes and variations that were commonly observed. Lamarck stated that in most instances, specific changes and variations in different forms were correlated with the use or non-use of the organs or characters of the being involved. In his presentation of this thesis he recognizes two laws of nature, namely that in every animal that has not finished its term of development, the constant and systematic use of any organ strengthens and develops it and increases its size proportionate to the length of time it has been employed. On the other hand, the continued lack of use of any organ gradually weakens it until it at last disappears. The second law was that nature preserves everything she causes the individual to acquire or lose through the influences of the environment to which its race has been for a long time exposed. In brief, Lamarck explained the diverse instances of certain characters on the basis of the use or non-use which was made of these characters or organs throughout the life activity of the individual. Darwin, on the other hand, based his researches on the theory of population presented by Malthus. This author, in his work on population, published in 1798, claimed that population increased by geometrical ratio, that is by multiplication, while food supply on which populations must depend decreased by arithmetical ratio, that is by addition. Thus it was therefore quite evident that depletion of population by pestilence and disease are brought about for

economic reasons, otherwise the races of plants and animals would in a very short time far exceed the food supply.

Darwin recognized this principle and applied it as a cause for the survival of living organisms against those forces that tended to deplete the population. He claimed that the individuals that survived the various causes for depleting the population did so by natural fitness through the use of intelligence, instinct or characters that enabled the individual to escape the calamity. Or in other words, the individuals that now make up a population of plants or animals are the result of a natural selection based upon the fitness or adaptation to survive the exigencies of life. Herbert Spencer afterwards applied to this principle the term "survival of the fittest." Darwin's principle, thus enunciated, is substantiated by a great number of instances among both domesticated and wild plants and animals.

From the time of Lamarck and Darwin, numerous investigators have written on the general subject of variations in plants and animals and their significance. The plant breeder, or person engaged in the improvement of plants, recognizes these principles and makes practical application of them. It should be said here, however, that the principles by which plants may be improved under the hand and direction of man is not by haphazard methods. The sciences underlying these practices are just as definite and applicable as the sciences underlying medicine or other professional practices. It is true that much progress has been made by men not thoroughly trained in the sciences that bear on this subject, but it is equally true that permanent progress both from the scientific as well as from the practical point of view is not possible by those not versed in the sciences relating to plant improvement. For the purpose of indicating the scope of learning that is essential to the proper practices of this activity, the following sciences are mentioned: mathematics, physics, botany, geology, physiology, nutrition, thremmatology, cytology, agronomy; and the languages, French, German, Greek and Latin are also quite essential; and best of all is the exercise of good judgment, for in no other line of scientific endeavor does the play for good judgment come with better advantage than in the activities of plant improvement. It is to be noted that the languages Latin and Greek are very important in this connection, for so many of the terms used have originated from these languages, and oftentimes without a knowledge of these languages, the relations and significance of terms used or desired to be used may not be brought out. Likewise, French and German are quite essential because much of the progress which has been made in these activities has been recorded in these languages and one may not hope to keep abreast of the advance of these sciences without being

able to read French and German. For the purpose and scope of this lecture the financial and ethical improvement cannot be better stated than in the words of Luther Burbank. Of course any number of specific instances can be given where the improvement of plants has added to our financial resources, but the whole matter is well summed up in the following paragraph:

"The vast possibilities of plant breeding can hardly be estimated. It would not be difficult for one man to breed a new one, wheat, barley, oats or rice which would produce one grain more to each head, or a corn which would produce an extra kernel to each ear, another potato to each plant, or an apple, plum, orange or nut to each tree. What would be the result? In five staples only in the United States alone the inexhaustible forces of nature would produce annually without effort and without cost:

5,200,000 extra bushels of corn;
15,000,000 extra bushels of wheat;
20,000,000 extra bushels of oats;
1,500,000 extra bushels of barley;
21,000,000 extra bushels of potatoes.

"But these vast possibilities are not alone for one year, or for our own time or race, but are beneficent legacies for every man, woman or child, who shall ever inhabit the earth. And who can estimate the elevating and refining influences and moral value of flowers with all their graceful forms and bewitching shades and combinations of color and exquisitely varied perfumes? These silent influences are unconsciously felt even by those who do not appreciate them consciously, and thus with better and still better fruits, nuts, grains and flowers will the earth be transformed and man's thoughts freed from the base destructive forces into the nobler productive ones, which will lift him to higher planes of action towards that happy day when man shall offer his brother man not bullets and bayonets, but richer grains, better fruits and finer flowers.

"Cultivation and care may help plants to do better work temporarily, but by breeding, plants may be brought into existence which will do better work always, in all places and at all time. Plants are to be produced which will perform their appointed work better, quicker and with utmost precision."

In contrast to the great importance of this subject it is to be noted that systematic progress in the improvement of plants has been made only during recent years. For this tardiness three reasons may be here noted.

First, the sexuality of plants has not been understood until recent years; the sexuality of animals has been understood from

time immemorial. It was not until 1691 that Camerarius pointed out the fact that in order for a plant to produce seeds or fruit it was necessary for pollen of one flower to be transmitted to the pistil of either the same flower or that of another. He pointed out that the essential parts of a flower in the production of fruit and seeds, were the stamens and pistils, and experimental evidence that the transfer of pollen was necessary in the process was presented. In connection with discoveries of this kind, however, it must be noted that knowledge of this nature among the class of people whom it might benefit, travels very slowly. It is a notable fact that farmers are very conservative and oftentimes do not have the means of obtaining the information that is available to other classes of people. Moreover they are slow to put away old practices for new, until profits in new practices have been demonstrated. For these reasons, even though the nature of pollination was known, yet it was slow to find application to the practices of plant production.

The second reason for the tardiness in the improvement of plants may be ascribed to the difficulty of controlling pollination in plants. It will be noted in this connection that many plants are pollinated solely by the wind, also many plants are pollinated by insects, and a great many are pollinated by both methods. Very few plants are pollinated solely through the agency of man. By reason of the importance, and because of the difficulty of controlling the pollination in the improvement of plants, slow progress has been made in improving strains, either in yield or in adaptation. Until methods were devised for controlling the pollination of those plants coming under the first two causes mentioned above, practically no progress was made. As instances of this, note the great improvement that has been made in the varieties and grades of wheat, while on the other hand, improvement in cotton, which plant has been in use about as long as wheat, was made in any marked way until the invention of the cotton gin. Pollination of wheat, it will be noted, is under control whereas that of cotton is not. Without methods for controlling the pollination, we have no way of knowing the nature or parentage of the pollen by which a pistil may be fertilized. Consequently, oftentimes, good individuals may be weakened in their progeny, by the presence of pollen from weak individuals.

In the third instance, until only recently the seed has been looked upon as the unit for propagation. It has now been demonstrated with almost no exceptions that instead of the seed, the plant itself constitutes the unit for purposes of propagation. It is well-nigh impossible to improve a strain of poultry by selecting eggs, whereas on the other hand, it is quite possible to improve the strain by selecting individuals that are

own to possess the characteristics desired. In like manner, more rapid progress may be made by selecting seeds of all characteristics from only those plants that manifest the specific characteristics desired. As a specific instance it may be mentioned that oftentimes good potato tubers are borne by plants that have no ability to reproduce the excellent characteristics. It would be much better to select tubers for seed from a potato plant bearing a large number of medium sized tubers than it would be to select from a plant bearing one large tuber and a number of small ones. Or in other words, if a large tuber from a hill of many small ones were selected for seed, in all probability the resulting plant would manifest the characteristic of producing small tubers. This instance offers one of the reasons why it is often claimed that potatoes "run out". Numerous other instances could be mentioned in the cases of corn, wheat and especially in the fruit plants where the seeds do not come true.

In the improvement of plants, three steps are essential. In the first place, variation must either be found or induced, because there can be no definite improvement until variation along the line of the desired improvement is either found or induced. Variation may be induced: First, by modifying the environment. The environment may be modified through changes in soil, climate, food supply, space and cultivation. Which of these agencies shall be employed will depend largely on the nature of the plant in hand and the nature of the improvement sought. Of the factors mentioned, perhaps climate, food supply and cultivation play the most important parts. It not infrequently happens that plants may be dwarfed or modified to suit cropping conditions by changing from one climate to another. Lateness or earliness of flowering or ripening fruit may be brought about by change from a warmer to a colder climate, and from a colder to a warmer climate, respectively. Food supply often plays an important part in changing the size, flavor and color of fruits, or the foliage and vigor of plants. Cultivation may play an important part in changing the quality of a plant or its products. Space, perhaps, plays its most important part in enabling the plant breeder to recognize individuality. Thus it has been impossible to improve the grasses and other forage crops grown in close community till they were separated as individuals.

The second method of inducing variation is by crossing, thus, changing the pollen of one flower to the pistil of another, and vice-versa. Crossing is generally resorted to when it is desired to combine one desirable quality of one individual with another desirable quality of another individual. For instance, wheat has been improved by this method when it was desired to blend the standing quality of one variety with the high yielding quality of another. It is also employed for the mere purpose of producing variation, for it is a well

variable than either of its parents, consequently when new types are desired, crossing is a fruitful method of producing such types.

The second step in the practice of plant improvement is selection. As variation has been either found or induced, the individuals embodying the desired characteristics must be found and propagated. It is in this process that the best judgment is demanded. One must be intimately acquainted with the plant with which he is working, and must exercise good judgment as to the excellencies of the individual selected. In order to facilitate the work, it is generally recognized that to select the individual for as few characteristics as possible brings the best results. At the same time, however, it must be remembered that there are certain characteristics in plants that may be antagonistic. Productivity is often antagonistic to susceptibility to disease. Large size is often antagonistic to high color and flavor, and high yields are often antagonized by high qualities in fruit and seed. In selecting, one must also exercise judgment that the individual selected will reproduce its characteristics in accordance with the environment to which it is to be subjected. For instance, it would be useless to select large seed from a large plant growing alone when it is desired that the plants should grow close together. The probabilities are that the excellencies of the seed of the plant growing alone have been brought about not by inherent qualities of the plant but because of space or food supply or cultivation or some other agency.

The third step in the process of plant improvement is to test the selections made. This often requires three or four years or even longer in the case of trees. With plants, often not all of the selections prove desirable and it is only by testing the selections made that the undesirable ones may be cast out and the strain founded on superior stock.

In connection with these steps it should be noted that the plant breeder has the advantage of the animal breeder in that he can make use of large numbers, which is very desirable. In producing the carnation whose bell does not break open, selections were made from more than 60,000 plants. A famous English breeder of hounds when asked the secret of his success in breeding superior individuals remarked, "I breed many, and hang many." The advantage to the plant breeder is that oftentimes his progenies can be tested yearly, whereas with animals, especially cattle and horses, several years are required before the performance record of the individual can be obtained.

It should also be noted that with the plant breeder the ideal of the individual desired often originates in the breeder's mind and is afterwards worked out from the large amount of material available.

SUMMARY.

Plant improvement is based on the principles of evolution. In order to obtain the best results with the expenditure of the energy, good judgment and a high degree of training is required. The plant is the result of heredity and environment.

Three steps in improving plants:

1 To find or induce variation:

(1) By change of environment:

- (a) food supply,
- (b) soil,
- (c) climate,
- (d) space,
- (e) cultivation.

(2) By crossing:

- (a) to combine good qualities,
- (b) to create new varieties or strains.

2 Selection:

- (1) Best characters;
- (2) Correlated characters.

3 Testing and propagation.

FOREST RESOURCES OF SOUTH AMERICA.

The forests of South America are principally tropical, but in the Andes Mountains and the southern end of the continent are found forests of a temperate and sub-arctic character resembling somewhat those of the United States and Canada.

The tropical forests are totally different from our north woods. There are no solid stands of single species or even of a few mixed species. Instead, hundreds of kinds of trees grow thoroughly mixed and scattered through the whole forest. This is one of several reasons that makes logging in tropical forests so expensive and often unprofitable.

Rubber hunters have explored nearly the whole tropical forest in search of that necessary article of commerce, but aside from that South American forests have only been cut into for a few miles back from the coast and the principal ports and rivers. Even in this area only the species at present most valuable for commerce have been thus far cut, for example, cedar, mahogany, rosewood, lignum-vitae, fustic and ironwood. Railroads, where they exist, charge such exorbitant freight rates that they have not much encouraged exploitation of the forests.

STRENGTH TESTS OF OHIA LEHUA.

Through the courtesy of Mr. W. E. Hodges, general purchasing agent of the Santa Fe Railway, the FORESTER is able this month to publish a series of tables showing various facts in regard to the strength of Ohia Lehua (*Metrosideros polymorpha*) timber.

These tests were made for the Santa Fe Railway at the U. S. Forest Service Timber Testing Laboratory at Purdue University, Lafayette, Indiana, by Prof. W. K. Hatt, Professor of Civil Engineering and Director of the Laboratory.

In his letter giving permission to make these tables public Prof. Hatt says, "I think it should be carefully stated that the tests were preliminary and need further tests for full information concerning the character of the wood." The figures given below should therefore be regarded as subject to slight modification as the result of more extended tests.

Prof. Hatt's report to the Santa Fe is as follows:

COMPLETE REPORT ON TESTS OF OHIA TIES FOR THE SANTA FE RAILROAD TO SUPPLEMENT PROGRESS REPORT SENT UNDER DATE OF JAN. 18, 1909.

Prefaratory Note.—The shipment consisted of three Ohia ties sent by Mr. E. O. Faulkner, manager of the Tie and Timber Department, The Atchison, Topeka and Santa Fe Railroad.

Results of Tests.—Table 1 shows the results of tests of full sized ties compared with other full sized tie timbers of various woods.

It will be noted that the Ohia tie has a large amount of moisture, 74 per cent., and is extremely heavy, not only in the wet condition, but also in the dry condition.

It will be noted that the fiber stress at the elastic limit in cross bearing is 1127 pounds per sq. in., which is about the same as good quality of red oak. It is possible that this stress might be larger when the timber was more completely dried. The Ohia holds the common spike with but slightly less resistance than the red oak. The screw spikes pulled out at a resistance force of 10,860 pounds, whereas the screw spike pulled out of red oak at a resisting force of 14,234 pounds.

Table 2 gives a detailed summary of the main tests of the Ohia wood entered on Table 1.

Minor Tests.—Table 3 gives a comparative statement of relative strength of Ohia wood and other woods in the form of small

test pieces. This contains not only the strength perpendicular to the grain, but the strength in flexure, end compression and shear. It will be noted that the Ohia wood is to be classed as exceptionally strong wood in flexure and end compression and other exhibitions of strength. It is unfortunate that there are not available any tests of white or red oak in the green condition in the form of small sticks suitable for insertion in Table 3, but it may be stated that, in these tests, Ohia may be classed with the strongest of the oaks.

Table 4 gives a detailed statement of minor tests, the average results of which are inserted for comparison with Table 3. Referring to Table 4, it will be noted that the resilience to maximum load is an indication of the toughness of the wood to withstand shocks. This resilience to maximum load has an average of about 9.81 pounds per cubic inch.

This is somewhat less than one-half of the toughness of hickory. It is the impression of the writer that the toughness of Ohia and oak are about the same.

Weight of Ohia Wood.—It has been stated that the weight of the timber is high. The dry specific gravity of Ohia wood is compared with other woods as follows:

Ohia . . . . .	.64
Red Oak . . . . .	.61
White Oak . . . . .	.61
Shortleaf Pine . . . . .	.47
Longleaf Pine . . . . .	.58

Conclusions.—On the whole, this wood compares with the best red oak in point of strength. The lack of reliable data as to strength of white oak renders a comparison with the latter species difficult.

Respectfully submitted,

W. K. HATT,
Civil Engineer.

Lafayette, Indiana, January 21, 1909.

TABLE NO. 1.

TABLE SHOWING RESULTS OF TESTS ON TIE TIMBER.

RAIL BEARING TESTS.				SPIKE PULLING TESTS.							Grade		
Numer of Tests.....	Species	Condition	Percent of Moist- ure	Specific Gravity Dry	Weight per cu. ft as tested.....	Comp. at Elastic Limit.....	Fiber Stress at					Maximum Load	
							Elastic Limit...	.5 Inches Comp.	Common Spike	Screw Spike.....			
					Pounds	Inches	Lbs per sq in.	Lbs per sq in.	Lbs per sq in.	Lbs per sq in.			
3—	Ohia.....	Slightly Surfaced Dried.	74.5	.629	67.4	.119	1,127	2,297	7,913	10,860		Pole Ties	
48—	Red Oak.....	Partly Air Dry.....	40.0	...	...	.120	1,190	2,484	8,150	14,234		
5—	White Oak.....	Partly Air Dry.....	...	...	...	...	...	...	6,950	13,026		
28—	Loblolly Pine.....	Seasoned	20.0	...	38.4	...	503	...	3,670	7,748			“
12—	Hardy Catalpa.....	Green	59.0	.419	41.6	...	288	...	3,224	8,261			“
11—	Common Catalpa.....	Green	38.4	.382	33.0	...	425	...	2,887	6,939		“	
4—	Chestnut.....	Seasoned .....	...	...	...	...	...	...	2,980	9,418		Structural Timber.
142—	Douglas Fir.....	Partially Air Dry.....	19.5	.462	34.4	...	597	...	Tests on	Tests on			
57—	Western Hemlock.....	Partially Air Dry.....	34.1	.427	35.8	...	478	...	Tests on	Tests on		Structural Timber.	
22—	Longleaf Pine.....	Partially Air Dry.....	25.1	.576	45.1	...	616	...	Tests on	Tests on		Structural Timber.	
5—	Longleaf Pine.....	Partially Air Dry.....	27.1	.566	45.1	...	719	...	Tests on	Tests on		Structural Timber.	
									Merchantable.	Select.			

TABLE NO. 2.

OHIA WOOD FROM ISLAND OF HAWAII.

Detailed Statement of Main Tests.

RAIL BEARING TESTS.				SPIKE PULLING TESTS.						
Shipment and Piece No.	Lab. No.	Percent of Moisture	Specific Gravity Dry	Weight per cu. ft as tested	Comp. at Elastic Limit	Fiber Stress at		Maximum Load		Remarks
						Elastic Limit	.5 Inches Comp.	Common Spike	Screw Spike	
				Pounds	Inches	Lbs per sq in.	Lbs per sq in.	Lbs per sq in.	Lbs per sq in.	
52—1	24,574	67.5	.673	70.3	.092	1,066	2,560	8,680	11,170	Sawed Tie
52—2	24,575	73.6	.602	65.2	.064	1,284	2,500	8,820	11,730	Sawed Tie
52—3	24,576	82.4	.612	69.8	.200	1,032	1,836	6,240	9,680	Hewn Tie
Average		74.5	.629	67.4	.119	1,127	2,297	7,913	10,860	

PURDUE UNIVERSITY,
January 21 ,1909.

TABLE NO. 3.
STRENGTH OF VARIOUS WOODS.

Tests on Small Sticks.									
Species	Number o Tests.....	STATIC BENDING.			COMPRESSION				
		Percent of Moisture	Specific Gravi- ty Dry	Fiber Stress at Elastic Lim- it : : ..	Maximum Load	Modulus of Elasticity ..	Crushing Strength at Maxi- mum load	Crushing Strength at Elastic limit.....	Shearing Strength
				Lbs per sq in.	Lbs per sq in.	1000 lbs per sq in.	Lbs per sq in.	Lbs per sq in.	Lbs per sq in.
Ohia	12	75.4	.640	5,256	9,845	1,796	5,416	933	1,173
Hickory-Ohio Shag Bark.....	119	59.1	.648	5,400	10,610	1,335	4,380	....	....
Douglas Fir	259	30.2	...	5,680	8,500	1,760	3,590	651	770
Loblolly Pine	44	70.9	...	4,100	7,870	1,440	3,500	469	630
Western Hemlock	42	27.3	...	5,198	7,905	1,357	3,705	477	746
Tamarack	82	38.8	...	3,274	5,776	959	3,229	....	668
Norway Pine	133	32.3	...	2,808	5,173	960	2,560	....	589
Common Catalpa	7	32.7	.382	3,203	5,490	739	2,393	300	633
Hardy Catalpa	16	55.2	.419	1,927	3,766	433	1,768	371	576
Philippine Woods:									
Ipil	8	29.0	.750	7,551	12,159	1,304	7,904	2,100	2,100
Lauan	6	34.0	.510	5,637	8,293	1,355	5,060	703	908
Betis	8	22.4	.520	5,091	8,051	1,148	5,274	864	1,246
Apitong	3	75.8	.550	4,107	7,250	1,302	3,420	760	865

Shearing
Strength

Lbs per sq
in.

1,173
.
770
630
746
668
589
633
576

2,100
908
1,246
865

1, 1909.

Ohio
Hickory-O
Douglas F
Loblolly I
Western I
Tamarack
Norway P
Common C
Hardy Ca
Philippi
Ipil
Lauan . . .
Betis
Apitong .

THE VALUE OF THE HAWAIIAN FOREST.

A Paper read by Mrs. F. M. Swanzy at the First Meeting of the Woman's National Rivers and Harbors Congress of Hawaii, March 31st, 1909.

What was the primeval forest of Hawaii nei? One of the earliest historians stated some seventy years ago that "the Hawaiian forests are usually very dense and the trees overgrown with masses of fern and parasitical vines thickly interlaced and spreading their shoots in all directions, which makes it a task of great difficulty to penetrate their recesses"; he also mentioned "the upland region of Kauai, cold and wet, supporting a heavy growth of timber frequented only by wood cutters." Mrs. Judd writes in 1830 of the Health Station at Waimea, Hawaii, and the "long walk through a thickly tangled forest muddy with frequent rains and the trampling of the wild cattle," beyond which "the sun and daylight shone once more." Other writers of the time refer to the heavily wooded country on the windward side of the islands, so that it is not difficult to evolve a mental picture of the original forest sweeping down the stately slopes of Mauna Kea to the precipitous cliffs of the Hamakua coast, or from the mountains above Lihue (Kauai) reaching almost to the white sands of the beach. This vision brings with it a thought of regret that in their primeval luxuriance these forests are largely a thing of the past, and the same thrill of regret comes as one rides up the long curves of Haleakala above Makawao, where are still to be seen vestiges of great koa groves. Gaze on our own Nuuanu valley with a sigh for the beautifully shaded groups of koa and kukui that once clustered thickly there. A century ago sandalwood was abundant, and in order to pay certain debts of the kingdom and country, its collection was industriously enforced on all the islands and vast quantities were gathered together. "From 1810 to 1825 the sandalwood trade was at its height, and it was sold in Canton for incense or manufacture of fancy articles. While it lasted this wood was a mine of wealth to the king and chiefs who bought by its means guns and ammunition, liquor, boats and schooners, as well as silks and other Chinese goods for which they paid exorbitant prices." Liholiho's monopoly of the trade was carried to a disastrous extent, \$80,000 in sandalwood having been paid for the one item of "Cleopatra's barge," a yacht sent out from Boston. As a result, this tree was almost exterminated and is now to be found only in small numbers. It is a far cry from those old days to these but the point of view of sentiment specially appeals to those of us who are kamaaina, children of the land, although to all gathered here today, the question of the destruction of the ancient forest by one means or another and its disastrous results must be of the greatest interest.

Fornander relates that in 1792 Vancouver "gave some goats, fruit and garden seeds"; in 1793 he landed cattle and sheep on Hawaii, to be tabued for ten years; and in 1794 brought more cattle. In 1803 the first horse was landed, "exciting mingled error and admiration by its beauty and mettle." Who could then have foreseen that in less than half a century thousands of wild cattle would have been found on the table land at the foot of Mauna Kea, and in many other places as well, and that horses, sheep and especially goats would all have so multiplied and run wild as to have become a serious menace to the forests on the different islands?

Many stories could be told to illustrate this fact, but only one need be mentioned. In one district alone of Kauai, over two thousand wild horses, besides cattle, were to be found within a limited area, and as it was absolutely necessary to get rid of a large number, as many as possible were driven into a corral and any Hawaiian was given his choice of the first six he could lasso, those discarded being shot on the spot.

Though animals have been primarily the cause of deforestation, and fires in various sections have destroyed great tracts of forest, under normal conditions, protection from livestock would be sufficient precaution, as the forests would re-seed themselves; this, however, for several reasons does not take place in Hawaii. The multitudinous insects which devour the forests and what is thought by some to be a root fungus which is killing the natural woods by thousands of acres in a number of localities, also the heavy growth of the Hilo grass and other coarse grasses which cover the ground that seeds cannot germinate, are rapidly destroying forests in regions where water conservation is most needed." The Planters' Experiment Station, it may be said here, is now studying the question of means to neutralize the deadly effects of insects and other such destructive agents.

Mr. Hosmer divides the forest in general into "three main types, the koa and ohia forest lying between the elevation of two and six thousand feet; the mamani forest, a pure stand of another native Hawaiian tree found on the upper slopes of the higher mountains (excellent fence posts are made of this wood); and the introduced algaroba forest which occurs at the lower levels on the leeward side of each of the larger islands." Of the algaroba's great value to Hawaii nei, its wood for fuel, its pods for stock feed and its blossoms for honey, we all know.

Mr. Hosmer, from whom I freely quote, also divides the forests of Hawaii into two classes, the water-bearing and the commercial forest. "The latter lies for the most part on the leeward side of the Island of Hawaii, where from the nature of the topography and the remarkable porosity of rock and soil, there are no permanently running streams and only occasional springs. In such districts it is obvious that the protection of watersheds does not figure; consequently the chief value of this forest lies in the wood

and timber which it can be made to produce, and if it is managed in accordance with the dictates of practical forestry, successive crops of valuable timber can be obtained." "The two Hawaiian woods of commercial importance are koa and ohia-lehua, both heavy close-grained hard woods. Koa is used for interior finish, furniture, cabinet work and veneer, and ohia is valuable for railroad ties."

The typical and water-bearing Hawaiian forest, far and away the most important, consists as in the old times of a dense jungle of trees, high growing shrubs, tree ferns and climbers, with much undergrowth and a heavy ground cover of ferns and bracken. Altogether it is a plant community admirably adapted for the conservation of moisture, for preventing erosion and serving as a reservoir to feed the springs and streams that rise within its bounds." The forest in all the reserves is of this type, as the most important product of these reserves is water; and now we come to the practical point of view, the relation borne by the forests, not only to the main industry of the Territory, the production of sugar, but to the continued welfare of the country and to all branches of agriculture, Hawaii being essentially an agricultural country largely dependent on irrigation. Our great problem is the conservation of water, that it may not immediately escape to the sea in freshets, carrying with it fertile soil in such quantities as to color the water for miles about. So the *preservation* and *extension* of our forests are obviously prime necessities as bearing the most intimate relation to the water supply. To quote again: "Over half of the fifty odd sugar plantations could not be carried on without irrigation and of the rest many use large quantities of water annually for fluming cane, for power development and for other economic purposes. To bring water out from the moist windward districts and distribute it for use, over \$15,000,000 have been expended, wholly by private enterprise, in the construction of ditches, flumes and tunnels. It follows naturally that where the demand for water is so great, care should be taken to protect the sources of supply." "Throughout Hawaii are large areas potentially rich in soil, but semi-arid in character and needing water to make them productive, so the primary value of the forests is the development of these lands. As it is easily destroyed by cattle or men it is necessary that the forest cover should be maintained strictly intact, and therefore fresh reserves have been created." Governor Frear has said that "Congress in general believes in helping States and Territories that help themselves, and it is now helping us in many ways."

More than thirty years ago steps were taken by the Hawaiian legislature for the preservation and extension of the forests, but not until some five years ago, under Governor Carter was a comprehensive statute passed creating an effective Board of Agriculture and Forestry, with adequate power. We are now

one of the eleven states employing foresters, though there are twenty-seven employing forest officials. "At the present time 16 forest reserves have been set aside by proclamation of the Governor of the Territory, with a total area of 444,116 acres, of which 61 per cent. is Government land." In time it is probable that about 750,000 acres altogether will be included in the reserve. The good results of fencing are already to be seen in the appearance and increase of plant life within the reserves. On one side of the fence a vigorous young growth may be found; while on the other the ravages of cattle and goats are as distinctly in evidence.

The second main branch of the forest work of Hawaii is the planting of desirable trees in otherwise unproductive areas; these trees should be chosen and set out under competent advice. Leading sugar plantations and stock ranches planted last year nearly half a million trees and this year will doubtless see the work greatly increased in scope. Apart from any other result those who plant trees of the right kinds now will be so much the better off when the rising prices of wood, owing to the prodigal methods by which forests of the American mainland have been exploited and the consequent scarcity of timber, shall be more keenly felt here.

To quote, "Forestry then has an important part to play in the life of the Territory. As one of the main factors in the field of Conservation it touches the industrial life of the community at many points. Land, water and wood are fundamental needs. The forests of Hawaii, native and introduced, help man to utilize the lands, to harness the streams to do his bidding, and to supply him with the wood that he needs in so many ways." Feeling then the importance of this great movement in our midst as we must, let us lend our aid to the great work on the mainland! Let us make use of that wonderful power of thought in which we all believe, and help with all our hearty interest towards creating that vast wave of public sentiment which will carry this conservation project to a triumphant issue!

THE GREAT AMAZON FOREST.

The great forest of the Amazon basin is eleven hundred miles long east and west by seven hundred and fifty miles north and south. It covers nearly a million square miles in Brazil. But as it lacks construction timbers it can not be looked to for relief from the approaching scarcity in that kind of wood.

This Amazon forest presents the usual features of tropical growths, a tangle of vines weaving the great trees together and obscuring the sky, and leaves hanging from the branches like ropes, while underneath is a snarl of shrubs and creeping plants in which are hidden many species of fibrous plants and cacti with their sharp stings and thorns.

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

Division of Forestry.

ROUTINE REPORT.

Honolulu, Hawaii, May 12, 1909.

Board of Commissioners of Agriculture and Forestry,
Honolulu.

Gentlemen: I have the honor to submit the regular report of the Division of Forestry for the month of April.

FOREST RESERVE PROJECTS.

During the first part of the month my own time was largely occupied with the preparation of several reports in connection with projects to set apart additional areas of forest land on the islands of Hawaii, Maui and Kauai as forest reserves. These projects include the proposed Mauna Kea Forest Reserve on Hawaii, the proposed Waihou Spring Reserve and a modification of the boundary of the existing Makawao Forest Reserve on Maui, and the proposed Lihue-Koloa and Moloaa Forest Reserves on Kauai. During the month I also submitted to the Board special reports on questions dealing with government forest land on Hawaii and Molokai, respectively the lands of Waiea in South Kona, and Ualapue and Kahananui on Molokai.

CUTTING OF DEAD WOOD ON WALANAE-UKA.

On April 15 and 16 I made an inspection of the wood cutting operations on the land of Waianae-uka, above Wahiawa, on the island of Oahu. As a result of this inspection I submitted a report to the Board under the date of April 20, making certain recommendations in regard to the conditions under which the work should be done under the extension of the license to cut. These recommendations were approved by the Board and have since been incorporated in a new agreement between the Land Commissioner and the licensee, Mr. W. L. Hopper. The object is the better protection of the undergrowth that is coming up on the land burnt over some years ago.

TREE PLANTING ON HALEAKALA.

From April 23 to April 27 I was away from Honolulu on the island of Maui, making an inspection of the inclosures erected on the land of Kalialinui on the upper slopes of Haleakala where, under the appropriation of the U. S. Forest Service, experiments are to be conducted in planting coniferous trees from the Temperate Zone. The work of enclosing these plots has been completed in a satisfactory manner. The planting will begin in the near future.

EXHIBIT FOR THE EXPOSITION AT SEATTLE.

During the month of April practically all of the time of Mr. Rock, the botanical assistant, and not a little of my own, has been given to preparing the exhibit of Hawaiian woods and plants that is to go to the Alaska-Yukon-Pacific Exposition, to be held this summer at Seattle. The collection has been carefully prepared and should be of considerable interest. In addition to the wood specimens and the herbarium material, maps and charts showing the existing forest reserves will also be sent.

PLANTING PLAN FOR KUKAIAU LANDS.

A detailed planting plan, the result of a visit to the lands of the Kukaiau Plantation Company's ranch made sometime ago, was drawn up by Mr. Haughs during April to assist the company in carrying out their agreement with the Government to plant these lands with forest trees.

MISCELLANEOUS WORK.

In connection with the preparation of herbarium material there has now been got together in usable shape considerable information in regard to the names and uses of native Hawaiian and introduced plants. It is the intention to continue the preparation of this material until it can be made of use to the general public in the form of popular bulletins. There is very marked need for just such publications, but before they can be issued much careful scientific work has to be done.

Requests for forest trees and seed for planting continue to come from plantations and others in the different parts of the Territory. Arrangements are going forward whereby by next fall trees in good numbers can be given out from the substation at Kalaheo on the island of Kauai, and also from another station about to be established in the Hilo District on the island of Hawaii.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

Division of Entomology.

REPORT OF SUPERINTENDENT OF ENTOMOLOGY FOR APRIL, 1909.

Honolulu, Hawaii, May 1, 1909.

*Honorable Board of Commissioners of
Agriculture and Forestry of the
Territory of Hawaii.*

Gentlemen:—The following report covers the work of the Division of Entomology during the month of April:

HONOLULU INSPECTION.

We boarded twenty-five vessels and found live vegetable matter on nineteen of them. This was disposed of in the following manner:

Disposal with Principal Causes.	Lots.	Parcels.
Passed as free from pests.....	560	32,595
Fumigated before releasing.....	25	110
Burned	7	15
Ordered returned	1	5
Dipped in Bordeaux.....	1	2
Dipped in Formalin.....	1	1
	<hr/>	<hr/>
Total examined	595	32,728

The articles destroyed included fruit from the Orient; orange trees in the mails from Japan badly infested with fungus and unknown leaf miner; maggoty turnips, and a staghorn fern from Australia alive with caterpillars and a huge colony of ants. What we have seen of the ant it did not look familiar and all stages were represented. A normal dose of hydrocyanic acid gas failed to kill those of them that were hidden in the folds of the plant, and, to avoid a risk, it was burned.

Our usual reasons induced the fumigation of various plants with the following notable examples:

The "Concord" brought 21,000 cocoanuts from Fanning Island. Upon examination these were found clean and, as we were assured besides that every one of the nuts spent about 48 hours in the sea before being loaded, they were passed. In course of their unloading, however, some cocoanuts were observed that had still retained green color and upon close inspection were found inhabited by a species of "snow" scale (*Hemichionaspis minor*). These,

fumigated.

Three boxes of sweet corn were found badly infested with our corn leaf-hopper. We were informed that it was returned from San Francisco because of these insects. We fumigated them before releasing.

One lot of seed coffee came from the Dutch East Indies. There is a most destructive coffee leaf disease (*Hemilaea vastatrix*) prevalent in that section of the world. Not many years ago it has laid waste the coffee fields of Ceylon and other islands in the East Indies. By way of precaution therefore we secured the consent and coöperation of the importer to annihilate all possible contamination by immersing in the standard solution of formalin, consisting of one pint 40 per cent. (Commercial) formalin in 15 gallons of water for an hour. It may be well to state in this connection that we will always be glad either to treat or prescribe treatment of seeds when necessary, at the owner's request.

Aphis or plant lice on roses and carnations was another common cause for fumigation.

Nurserymen on the Mainland were observed to remove the soil from the roots of some shipments of plants and not others, from which we infer that they do so at the request of importers, not all of whom seem as yet informed of our strict ruling against soil. The great variety of possible pests inhabiting soil leaves us no discretion in the matter.

HILO INSPECTION.

Upon his work in Hilo during the month of April Bro. Matthias writes as follows:

"Eleven foreign vessels came to anchor in Hilo Bay. Had inspection work on board of two of them, eight on the wharves and nine at the postoffice.

"One ship came in ballast consisting of soil and rock, which was dumped into the sea.

"There were 90 lots and 1,479 parcels.

"Seventy-five sacks of potatoes underwent the cleaning process before being admitted.

"Several hundred plants of various descriptions were fumigated, adhering soil and wrappings were consigned to the deep.

"Two cases of small grasses being badly infested with slugs, went the same way.

"One parcel of gladiola bulbs was infested with aphis, presumably the species mentioned in 'Journal of Economic Entomology' of 1908, page 230. The bulbs being of fancy varieties were carefully cleaned and treated with cyanide before being passed. This is the second time I came across this insect on gladiola bulbs."

LOCAL INSPECTION.

At the request of the owner, a Monterey cypress hedge was examined and found badly infested with the Australian beetle roach (*Eleutheroda dytiscoides*). This is a very common pest and especially so on Monterey cypress. Chickens are very fond of the roach and, if trained to follow the attendant, they will pick up all the roaches shaken off the trees, and the pest may thus be kept in check. Single plants or where they are not too crowded in a hedge may be sprayed with an arsenical, like Paris green (lead arsenate, being white, would not do), provided the sprayed plants are beyond reach of live stock or poultry.

An idea that has repeatedly come up during such visits and which has finally crystalized in the entomologist's mind is the great need in Honolulu of a reliable, trained expert horticulturist capable of carrying into effect various instructions given by the entomologist. Moreover, in nine cases out of ten the difficulty is of a horticultural character. Improper irrigation, wretched or no trimming, amateurish landscaping are examples. Finally, the preparation and application of an insecticide or fungicide requires intelligence the garden owner can almost never spare and his yard boy does not possess. An expert as here suggested must be well paid, but employed only for the actual time his services are required would not be a burden to his employer and his work would render gardening of any kind a joyful task. Such an individual, on the other hand, should find little difficulty in finding continuous employment. In order to prevent the possibility of duplicity such persons should be required to show references from local horticulturists and entomologists.

A lot of cocoanut bunches for the Alaska-Yukon Exposition were inspected and having been found infested with live scale bugs were fumigated.

IMPORTATION OF FIG INSECT.

This spring we resumed our effort to introduce this insect into the Territory in order to make Smyrna fig culture possible. Two consignments were received by courtesy of the Fancher Creek Nursery of Fresno, California, during the month and with the kind coöperation of Hon. S. M. Damon located in Moanalua. The first lot came on ice and consisted of apparently insufficiently advanced stages. There being no evidence of results another lot was cabled for and the mails brought it on the 23rd. This came in excellent condition. For the first time we received the insects alive issuing from the figs. It is yet too soon to say whether they infested our growing figs, but all opportunity was given the insects to do so.

MISCELLANEOUS.

After consultation and with the consent and approval of the President, Mr. Robert Miller, recommended by Mr. Rath, was engaged temporarily to assist in the work of inspection. Pending the appointment of an Assistant Entomologist, Mr. Kuhns is retained in the laboratory looking after the collections and work of insect breeding.

Respectfully submitted,

JACOB KOTINSKY,
Superintendent of Entomology.

DEPARTURE OF LOCAL ENTOMOLOGIST

Mr. D. L. Van Dine has recently left Hawaii to accept a position in the Bureau of Entomology at Washington. His special work will be on insects affecting sugar cane and rice in the Southern States. Mr. Van Dine's entomological work in Hawaii has well qualified him for his new field of research and we look to see him continue the excellent work for which he has been conspicuous in Hawaii.

A CORD OF WOOD.

The standard measurement for fire-wood is the cord, a quantity, it is well known, containing 128 cubic feet. A pile of wood eight feet long, four feet high and four feet wide contains the requisite quantity. Although a cord of wood may fulfil the legal requirements, the measure is of uncertain quantity, dependent upon whether the sticks are long or short, stright or crooked, round or split.

A cord of four foot hardwood usually contains about 83 cubic feet of solid wood. A cord of one foot pieces contains about 85 cubic feet. Soft woods contain from 90 to 96 cubic feet per cord. Thus the purchaser receives on an average about two-thirds of a cord of real wood and one-third of a cord of spaces.

The bulk of wood decreases materially as seasoning advances. A cord of green wood is reduced by about fourteen per cent. in drying. The purchaser will therefore practice the greatest economy by buying straight, smooth, well-seasoned sticks cut into lengths of not more than two feet.

Beyond this, it should be remembered that cords of long sticks are pretty sure to contain more empty space than cords of short pieces, and also split wood does not lie so compactly as round pieces. The finer the wood is split, the more it makes and dealers get back the cost of labor in increased bulk.

COTTON IN HAWAII.

There has recently been published by the Hawaii Agricultural Experiment Station a press bulletin of especial interest, entitled "A Preliminary Report on Cotton Experiments." Following its recent successful investigation on the tobacco and rice industries, the Station, upon the centering of interest in the possibility of cotton growing, commenced a series of experiments relating to cultural methods of this crop.

Nine varieties or strains, representing three distinct classes, have been tested for yield, quality of lint, habits of growth and methods of culture. Considerable attention has also been given to the selection of superior individual specimens, with a view to securing desirable mother plants from which to breed pure strains. It is believed that a method of propagation has been devised whereby the qualities of an individual plant may be perpetuated. Owing to the tendency of cotton to cross-fertilize, plants propagated by seed show more or less variability and any scheme which will tend to establish a uniform strain should prove a distinct aid in cotton breeding.

A systematic pruning experiment was begun as soon as the first crop was harvested, the general culture project including the test of varieties as a perennial crop. In addition to the experiments conducted on the Station grounds, which are reported in full in the bulletin, several coöperative experiments were conducted in different parts of Oahu, the results of which are only briefly recorded. Beginning with the present year, two carefully planned experiments on a large scale were undertaken with private growers coöperatively, the Station supplying the seed, fertilizers and supervision.

That much local interest is being taken in cotton culture is attested by the application for seed and information, which has taxed the Station to the utmost. Seed has been distributed to about fifty applicants, representing many sections throughout the islands. Altogether, seed sufficient to plant about 200 acres has been distributed within the last twelve months and it is safe to say that at least 100 acres are planted to cotton at this time. While definite conclusions cannot be drawn from a single set of experiments, the data contained in the bulletin indicate some of the possibilities of cotton growing in Hawaii.

The experiments have been conducted by Mr. F. G. Krauss, Expert in Agriculture, and an account of the results obtained is contained in Press Bulletin No. 24, which can be procured from the Experiment Station.

IMPORTANT AGRICULTURAL MEETINGS.

The next annual meeting of the American Association of Farmers' Institute Workers will be held at Portland, Oregon, August 16 and 17, 1909. At the same place and beginning August 18 will be held the annual meeting of the Association of American Agricultural Colleges and Experiment Stations.

This is the first time that the Association of Farmers' Institute Workers has met upon the Pacific coast, and it is desired that as many will attend as possible in order that the work of the farmers' institutes in the various States and Provinces may be fully represented.

NEW FARMERS' BULLETINS.

Experiment Station Work, L. Compiled from the Publications of the Agricultural Experiment Stations. Pp. 32, figs. 14. (Farmers' Bulletin 353.) Contents: Commercial clover seed—Dodder in alfalfa seed—Growing potatoes under straw—Hens versus incubators—Preparing fowls for market—Preservation of eggs—The mound-building prairie ant—Coagulation of milk in cheese making—Effect of alkali on cement structures—Silo construction—A cheap and efficient sterilizer—A cheap and efficient ice box—The power laundry for the farm.

Onion Culture. By W. R. Beattie, Assistant Horticulturist, Bureau of Plant Industry. Pp. 36, figs. 20. (Farmers' Bulletin 354.) This bulletin is published to supersede Farmers' Bulletin 39 on the same subject and discusses some late methods of growing onions, including a short treatise on the Bermuda onion industry.

A Successful Poultry and Dairy Farm. By W. J. Spillman. Pp. 40, figs. 7. (Farmers' Bulletin 355.) This Bulletin describes the methods of conducting an 80-acre dairy and poultry farm in western Washington and marketing the products.

The Repair of Farm Equipment. By W. R. Beattie, Assistant Horticulturist, Bureau of Plant Industry. Pp. 32, figs. 23. (Farmers' Bulletin 347.) This Bulletin contains lists and illustrations of the tools adapted to repair work on wood, iron, leather, etc., with suggestions for shop facilities and material required.

Experiment Station Work, XLIX. Compiled from the Publications of the Agricultural Experiment Stations. Pp. 32, figs. 3. (Farmers' Bulletin 342.) Contents: Conservation of soil resources—Potato breeding—Disc-harrowing alfalfa—The Montreal muskmelon—Storage of Hubbard squash—Fig culture in the South—Mushroom growing—Preserving wild mushrooms—Cooking beans and other vegetables—A model kitchen.

The Cultivation of Tobacco in Kentucky and Tennessee. By W. H. Scherffius, Collaborator, and H. Woosley and C. A. Mahan, special agents. Tobacco Investigations, Bureau of Plant Industry. Pp. 31, figs. 13. (Farmers' Bulletin 343.) An account of the early history of the cultivation of tobacco in the United States, with statements of late and improved methods for the management of the plant bed, fertilizers, preparation of the soil, topping, combatting insect pests, selection of plants, harvesting, curing, grading and marketing.

The Boll Weevil Problem, with Special Reference to Means of Reducing Damage. By W. D. Hunter, in Charge of Southern Field Crop Insect and Tick Investigations, Bureau of Entomology. Pp. 48, figs. 9. (Farmers' Bulletin 344.) This Bulletin is intended to supersede Farmers' Bulletin 216 on the same subject, and contains a summary of the practical results recorded in the numerous publications of the department on this subject, together with a statement of the results of more recent investigations.

IRRIGATION PUBLICATIONS.

Having recently received inquiries as to where information might be secured relative to the irrigation of small areas, the following publications are recommended as giving much valuable data:

"The Use of Small Water Supplies for Irrigation." By Samuel Fortier, Chief of Irrigation Investigations.

This article discusses the possibilities of securing water supplies from springs, wells, and stored storm waters, and gives the results of the use of such supplies in typical instances. The methods of developing springs, and building small reservoirs are described, and the installation and operation of small pumping plants are discussed. This article appeared in the Yearbook of the U. S. Department of Agriculture for 1907, but it has also been printed separately.

"Losses of Irrigation Water and Their Prevention." By R. P. Teele.

The irrigation investigations carried on by the Office of Experiment Stations for the last ten years have had for their primary object the securing of the best use of the available water supply. The measurements made have shown large losses of water by seepage from canals, by evaporation from fields, by percolation beyond the reach of plant roots, and by wasteful use. This article brings together the results of all the measurements of losses made, and describes the measures used to prevent them. It is largely a compilation from previous reports, and brings all this matter together in a single article. It first appeared in the An-

nual Report of the Office of Experiment Stations for 1907, but is now available as a Reprint.

In addition to the above, the following bulletins issued by the Office of Experiment Stations are suggested as being of use:

Bulletin No. 201. "Cost of Pumping from Wells for the Irrigation of Rice in Louisiana and Arkansas." By W. B. Gregory, Professor of Experimental Engineering, Tulane University of Louisiana. Pp. 39.

Bulletin No. 203. "The Distribution of Water in the Soil in Furrow Irrigation." By R. H. Loughbridge, Ph. D., of the University of California.

Bulletin No. 205. "Irrigation in Wyoming." By C. T. Johnston, State Engineer.

All the publications referred to above are obtainable from the Office of Experiment Stations, U. S. Department of Agriculture.

HAWAIIAN BEE KEEPING.

The visit of Dr. E. F. Phillips to the Hawaiian Islands last year was an event of great importance to the local honey industry. Upon his return to Washington Dr. Phillips embodied an account of his observations in a paper which has recently been issued entitled "A Brief Survey of Hawaiian Bee Keeping." The publication is an extremely interesting one, containing many typical illustrations and will no doubt be of great value to our local apiarists.

The pages devoted to "Bee Rights" and to "Sources of Honey" are particularly instructive and the concluding chapter on the nature of diseases and the means of preventing their introduction to Hawaii should be closely studied.

The article in question is Bulletin No. 75, Part V, of the Bureau of Entomolgy, and may be obtained from the U. S. Department of Agriculture, Washington, D. C.

A factory has been opened at Kalaoa, Hawaii, by W. Conradt, for the manufacture of Hawaiian starch. The manioca for this purpose is grown in the neighborhood and it is intended to market the product in one pound packages to retail at ten cents each. It is said that Hawaiian starch "pia" is of much greater value for laundry purposes than other varieties.

BY AUTHORITY.

TERRITORY OF HAWAII

BOARD OF COMMISSIONERS OF AGRICULTURE AND
FORESTRY.NOTICE OF APPOINTMENT OF HONORARY ENTOMOLOGICAL
INSPECTORS AT HANA AND LAHAINA, MAUI.

Notice is hereby given that we have appointed the following gentlemen as Honorary Entomological Inspectors for the districts and ports indicated, to wit:

W. B. DEAS, M.D.,
for the district of Hana, and especially the port of Hana; and

WM. ROBB, ESQ.,
for the district of Lahaina, and especially the port of Kaanapali, County of Maui.

All persons are requested to respect their authority.

MARSTON CAMPBELL,
President and Executive Officer.

Honolulu, Hawaii, April 28, 1909.

NEW LAWS RELATING TO AGRICULTURE AND FORESTRY.

ACT 87.

AN ACT

TO PROVIDE FOR THE CONSERVATION AND DEVELOPMENT OF THE NATURAL
RESOURCES OF THE TERRITORY, BEING SUPPLEMENTARY TO ACT 33 OF
THE LAWS OF 1909.

Be it Enacted by the Legislature of the Territory of Hawaii:

SECTION 1. All expenditures by the Territory on account of the Board of Agriculture and Forestry, Aid to Hawaii Experiment Station and Hydrographic Survey, shall be made out of the one-fourth of the special fund provided by Act 33 of the Session Laws of 1909; provided, however, that until a sufficient amount of said one-fourth is available, such sums as may be necessary may, with the approval of the Governor, be expended from the general revenues for the said purposes at not exceeding the following rates per month:

BOARD OF AGRICULTURE AND FORESTRY.

General:

Clerks and Stenographers (2 at \$100 each).....	\$ 200.00
Employees and Laborers.....	90.00
Expenses, all divisions.....	1,250.00

Division of Forestry:

Superintendent	250.00
Assistants, Laborers, etc.....	385.00

Division of Entomology:

Superintendent	250.00
Assistant, Inspectors, Employees, etc.....	470.00

Division of Animal Industry:

Superintendent	250.00
Assistants, Employees, etc.	280.00
Aid to Hawaii Experiment Station.	416.70
Hydrographic Survey	416.70

All sums so expended out of the general revenues shall be restored thereto out of the one-fourth of said special fund, as soon as may be.

SECTION 2. This Act shall take effect on the first day of July, 1909.

Approved this 17th day of April, A. D. 1909.

WALTER F. FREAR,
Governor of the Territory of Hawaii.

ACT 114.

AN ACT

TO AMEND SECTION 390B OF THE REVISED LAWS AS ENACTED BY ACT 82
OF THE SESSION LAWS OF 1905.

Be it Enacted by the Legislature of the Territory of Hawaii:

SECTION 1. Section 390B of the Revised Laws as enacted by Act 82 of the Session Laws of 1905, is hereby amended to read as follows:

"Section 390B. Said Board of Agriculture and Forestry shall have power and authority to make rules and regulations, and to amend the same from time to time in its discretion, subject to the approval of the Governor, for and concerning the inspection, quarantine, disinfection or destruction, either upon introduction into the Territory, or at any time or place within the Territory, of animals and the premises and effects used in connection with such animals. Included therein may be rules and regulations governing the transportation of animals between the different islands of the Territory and along the highways thereof, and also such rules and regulations as may be approved by the Governor requiring the owners and masters of any boat or vessel engaged in inter-island transportation of live stock, and the managers and agents of railway companies carrying live stock within the Territory, to make reports of the number and class of live stock carried, names of owners and consignees, the places to and from which such live stock is shipped, the manner of handling such live stock, the number of deaths or injuries to live stock occurring in transit or while being loaded or unloaded, with the causes of such deaths or injuries and all other matters which may be deemed necessary by the Board for a full and complete record of such shipping and handling of live stock. And also to prohibit the importation into the Territory from any foreign country, or other parts of the United States, or from one island within the Territory to another island therein, or to one locality from another locality on the same island, of animals known to be infected with a contagious, infectious or communicable disease or known to have been exposed to any such disease."

SECTION 2. This Act shall take effect upon its approval.

Approved this 26th day of April, A. D. 1909.

WALTER F. FREAR,
Governor of the Territory of Hawaii.

ACT 127.

AN ACT

RELATING TO THE COLLEGE OF AGRICULTURE AND MECHANIC ARTS, AMENDING
SECTION 3 OF ACT 24 OF THE LAWS OF 1907.

Be it Enacted by the Legislature of the Territory of Hawaii:

SECTION 1. Section 3 of Act 24 of the Laws of 1907 is hereby amended to read as follows:

"Section 3. A board of regents shall have the general management and control of the affairs of the college. They shall have power to appoint a treasurer and such other officers as they deem necessary and to require them to give bonds in such amounts as they may prescribe and in the form prescribed by law for bonds of public officers. They shall have power to purchase or otherwise acquire lands, buildings, appliances and other property for the purposes of the college, and expend such sums of money as may be from time to time placed at the disposal of the college from whatever source. The grants of moneys and the purposes of said grants authorized by the Act of Congress, approved August 30, 1890, for the more complete endowment and maintenance of colleges for the benefit of agriculture and the mechanic arts and by any other Acts of Congress for similar purposes, are hereby assented to. All lands, buildings, appliances and other property so purchased or acquired shall be and remain the property of the Territory of Hawaii to be used in perpetuity for the benefit of the college."

SECTION 2. This Act shall take effect upon its approval.

Approved this 27th day of April, A. D. 1909.

WALTER F. FREAR,
Governor of the Territory of Hawaii.

ACT 138.

AN ACT

TO AMEND CHAPTER 35 OF THE REVISED LAWS RELATING TO DISEASES OF ANIMALS BY AMENDING SECTION 447 OF THE REVISED LAWS AND BY ADDING A NEW SECTION THERETO TO BE KNOWN AS SECTION 447A.

Be it Enacted by the Legislature of the Territory of Hawaii:

SECTION 1. Section 447 of the Revised Laws is hereby amended to read as follows

"Section 447. Reporting disease, penalty. Any person knowing or having reason to believe that any animal on or about his own premises or the premises of another is affected with glanders, farcy or any infectious or contagious disease who shall fail to report same forthwith to a territorial veterinarian, shall be guilty of a misdemeanor and upon conviction shall be fined not less than five nor more than one hundred dollars."

SECTION 2. A new section is hereby added to Chapter 35 of the Revised Laws, to be known as Section 447A and to read as follows:

"Section 447A. The purchaser of any horse, mule or ass which shall develop symptoms of glanders or farcy within two weeks from the date of purchase may recover the full amount of the purchase price from the seller of such animal, together with such reasonable damages as the purchaser may have suffered; provided, however, that this section shall not apply to any animal which, at the time of sale, shall obtain from any licensed veterinarian a certificate that the animal is free from such diseases, and the seller shall be entitled to a refund of the purchase price of said animal without charge for said certificate."

WALTER F. FREAR,
Governor of the Territory of Hawaii.

WALTER F. FREAR,
Governor of the Territory of Hawaii.

THE HAWAIIAN FORESTER & AGRICULTURIST

I

JUNE, 1909

No. 6

June 5, 1909, Governor Frear signed proclamations creating new forest reserves in the Territory of Hawaii, whereby acres of government land were set apart in accordance with, for forest purposes.

In the additional reserves created, the boundary of the existing Makawao Forest Reserve on Maui was modified and the area of that reserve slightly increased. All told there are now 1,000,000 acres of forest reserves in the Territory of Hawaii. The total area is 545,764 acres. Of this 357,180 acres, or 65 per cent., belong to the Government. The remainder, 188,584 acres, is in private ownership, but almost without exception in the hands of persons or corporations who sympathize with the aims of the Territory in creating forest reserves and who are managing the forest property in accordance therewith.

The forest reserves newly created are the Mauna Kea Forest Reserve on Hawaii, 66,600 acres, all government land; the Wai-rising Forest Reserve on Maui, 84 acres, of which 74 acres belong to the Government, a small reserve made to protect an art spring on the slopes of Mount Haleakala; and the Koloa and the Moloaa Forest Reserves on Kauai; the latter with a total area of 29,260 acres, of which 12,945 acres, or 44 per cent., is government land; the latter 5,670 acres, of which 3,615 acres, or 64 per cent., belongs to the Territory. Both of these reserves are made with the object of protecting the forest on the important watersheds. They round out the block of reserved land surrounding the central mountain mass on Kauai and make that island the first on which the chain of forest reserves is complete.

In the case of most of the Hawaiian forest reserves the Mauna Kea Forest Reserve on Hawaii is made not for the purposes of water-protection, but to assist in the ultimate reforestation of the slopes of that mountain with trees of economically desirable species.

This in part will be accomplished through the natural growth of the Mamane, a valuable native tree, and in part through introduction, by means of artificial planting, of introduced species, especially conifers from the Temperate Zone.

Following the usual custom there is printed elsewhere in this issue the Forester the reports of the Superintendent of Forestry and the reports of the Forester to these projects, approved by the Board of Commissioners of Agriculture and Forestry, and also the official proclamation issued by Governor Frear that establish the areas accord-

RESEARCH LABORATORY AT KILAUEA.

During the last few years "Conservation" in its manifold applications has held a most important part in the activities of human endeavor. The conservation of the mineral deposits which once exhausted can never be replenished, and of the watersheds, which judicious policy can repair, has for some years occupied the attention of the world in a manner altogether without precedent. However important the preservation of our mines and our useful fauna and flora, all movements which look to the preservation or prolongation of human life itself must be deemed of infinitely greater merit. All investigations which bear in any manner upon this great question are worthy of the heartiest approval and coöperation. The proposal to establish an observatory at Kilauea to study the causes of earthquakes and eruptions and to compile data to enable seismic phenomena to be foretold bears directly upon the preservation of humanity and should meet with sufficient local support to enable it to be carried out upon a scale which will ensure the greatest possible benefit to mankind.

During the last century three hundred thousand persons perished from earthquake and volcanic disasters alone. So destructive have been these convulsions of nature recently that for the past eight years an average of over one hundred human beings have daily been destroyed. Such an appalling record resulting from the effects of war, pestilence or famine, would long ago have resulted in a concerted effort on the part of civilization to control the devastating forces at work producing it. It has, however, remained to the Massachusetts Institute of Technology to take the initiative in a project which will make the volcanoes of Hawaii the scene of investigations of earth waves and movements, with a view to predicting the approach of volcanic phenomena.

For long periods before earthquakes or eruptions take place there is little doubt that many significant phenomena occur, the proper understanding of which would enable timely warning of approaching disturbances to be given. It is to such phenomena and their meaning that the greatest interest centers, for upon their proper interpretation the destiny of many must depend. Unfortunately, hitherto, vulcanologists have been chiefly engaged in studying the effect of volcanic activities, which however important in aiding to a thorough understanding of the science, has in itself little practical bearing upon the subject now intended to be investigated.

The offer of the Massachusetts Institute was made through Professor Thomas A. Jaggar, Jr., at a recent address to the Honolulu Chamber of Commerce. It is a tentative proposal dependent upon the amount of local support which is accorded to it. In this regard it is satisfactory to learn that half the minimum maintenance fund required to be subscribed in Hawaii has already

been promised, and there can be no doubt that the full amount desired will be forthcoming in a short time.

The selection of the Hawaiian volcanoes as objects of study has been determined upon in consequence of their peculiar fitness for this purpose. Their accessibility, the consistency of their lava, their contour and extent, the constancy of their movements, and their relative safety alike combine to make them suitable for this purpose.

In order to insure the requisite local assistance to the proposed institution a committee consisting of Messrs. L. A. Thurston, J. A. Kennedy and J. F. Morgan has been appointed. A complete statement of the work proposed has been published and is here given in full:

THE PROPOSITION.

The Massachusetts Institute of Technology, one of the leading scientific institutions of the world, has determined to establish, somewhere, a station to keep a continuous record of earth movements, and to compile data and do research work in connection with such movements. The object of such work is the discovery of laws governing, and causes producing earthquakes and lava eruptions; with a view to ultimately being able to predict earthquakes and volcanic outbreaks and thereby minimize their destructiveness. Furthermore, in the light of the results of earth study, such an engineering school as the Massachusetts Institute is well equipped to investigate what forms of construction of houses, bridges, aqueducts, stacks and walls will best resist these great natural accidents. A circular was issued in March, 1909, outlining the project, signed by Arthur A. Noyes, Acting President of the Institute; George F. Swain, Hayward Professor of Civil Engineering, and Thomas A. Jaggar, Jr., Professor of Geology, the last two being the heads of their respective departments in the Institute.

SCIENCE OF GEOPHYSICS.

The purpose of the science of Geophysics is to record with instruments all the physical and chemical processes going on in the earth. Recent disasters such as Messina and San Francisco have shown how defective, for humane and practical purposes, our knowledge of these processes is. The study of near and distant earthquakes, considering the earth as a whole, can be conducted as well at one place as at another. Until recently it had been intended to establish the proposed station at Blue Hill, a point near Boston, where a meteorological observatory is located. It has been the desire of the Institute, however, to secure a volcanic site in order to observe the local activities of a particular volcano, as well as the waves which pass through the earth from distant earth-

quakes. Professor Jaggar has, for some time past, been investigating and considering this subject. He has visited the scenes of the volcano and earthquake disturbances in Martinique, Italy, St. Vincent and Alaska. In April, 1909, he visited the volcano of Kilauea, and then went to Japan where he visited the volcanoes Tarumai and Asama in eruption, and also studied the remarkable stations and instruments of the Imperial Earthquake Investigation Committee of Japan.

KILAUEA IS PREFERRED.

After mature deliberation Professor Jaggar is of the unqualified opinion that Kilauea affords the best point for the location of the proposed observatory among those places in the world which have come to his knowledge, for the following reasons:

1. At other volcanoes the eruptions are more explosive and an observatory located close enough to the center of activity is in some danger. Kilauea, while displaying great and varied activity, is relatively safe.

2. Other volcanoes are more or less connected in chains, making many stations necessary in order to determine the relations of the different craters to each other. Kilauea and Mauna Loa form an isolated center of activity, over 2000 miles from the nearest active vent, so that the phenomena of these two vents can be recorded without complications occasioned by other nearby centers.

3. Kilauea is very accessible. The nearby harbor at Hilo is only thirty-one miles distant; it may be reached by railroad and a good driveway, and Honolulu, a center of traffic and science, is easily reached in a day.

4. The Central Pacific position is unique, and is of advantage for recording distant earthquakes through the uninterrupted sea-floor which lies between Hawaii and many earthquake places, such as South America, Mexico and Japan. For expeditions in case of disaster or otherwise, a relatively short route is assured, with abundant means of transportation to Pacific and East Indian ports. For the study of the deep-sea floor, Hawaii is obviously favorable.

5. The climate is uniform and the air clear for astronomical work.

6. There are frequent small earthquakes, which are of great interest for technical reasons.

7. The remarkable distribution of both hot and cold underground waters in Hawaii needs careful study, and this has an important bearing on agriculture as well as upon science.

8. The territory is American, and these volcanoes are famous in the history of science for their remarkably liquid lavas and nearly continuous activity.

JUST WHAT IS PROPOSED.

Subject to changes in detail, it is proposed:

1. To erect buildings on the brink of the Volcano of Kilauea, in which to house the instruments, library, and offices for working up and tabulating the statistics, records and information obtained.
2. To set apart a room for a local museum; to exhibit to visitors instruments, plans, diagrams, maps and photographs. This will be of value in exciting interest with a view to securing an endowment.
3. To welcome advanced students from either the Institute or other institutions for special work in the laboratory.
4. To erect subordinate instrument stations, with self-recording instruments, and to employ voluntary observers, at various points hereafter to be determined. It is hoped that eventually some work will be done by the staff of the observatory in the study of tides, soundings, earthquake waves and the movements of the coast line of the island.
5. To send expeditions to other volcanic and earthquake belts for comparative studies.
6. To carry on research, as may seem expedient, in terrestrial gravitation, magnetism and variation of latitude.
7. To make a geological survey of the Island of Hawaii. It is hoped that this will lead to a thorough survey of the whole Territory by the U. S. Geological Survey.

HUMANITARIAN OBJECT.

It is believed that the best results will be obtained by making use of temporary quarters near the Volcano House for one or two years in order to make a reconnaissance of the field, so that the final building may be the result of some extended experience. The main object of all the work should be humanitarian—earthquake prediction and methods of protecting life and property on the basis of sound scientific achievement.

Results obtained in connection with all subjects of investigation will be promptly published in the form of bulletins and memoirs.

TENTATIVE OFFER.

The Massachusetts Institute of Technology tentatively offers, through Professor Jaggar as its representative:

1. To assume the entire responsibility of managing and carrying on the station and all of the work incidental thereto.
2. To erect all necessary buildings and equip the same with the aid of a gift from the Caroline A. R. Whitney Estate of Boston, the establishment to be named the Whitney Geophysical Observatory of the Massachusetts Institute of Technology.
3. To appoint trained men of science to have direct and indirect

charge of all the permanent work of the station and its branches, paying their salaries and to organize the staff of the observatory as a branch of the Research Laboratory of Physical Geology, in Boston. The payment of salaries by the Institute, however, shall include only Faculty members. Subordinate assistants and servants may be paid from the income fund.

COST AND AVAILABLE MONEY.

It is estimated that the buildings, furniture and equipment necessary for the purposes above set forth will eventually cost from \$20,000 to \$25,000. This, together with the salary of the resident Faculty officer, and the services of Administrative and Visiting officers of the Research Laboratory, represents the present limit of the financial resources of the Institute available for this purpose. It will cost more to establish a station at Kilauea than it would to place it at Blue Hill, Massachusetts. It is estimated that the pay of assistants and laborers, and running expenses, such as instruments, transportation, repairs, supplies and expeditions will amount to at least \$7000 per annum. The Institute has already received contributions toward operating expenses of \$2200.

The Institute asks from the citizens of Hawaii a subscription of \$5000 per annum, guaranteed for at least five years from the date when operations at the station shall begin. As the proposed work of day to day record with instruments must above all things be permanent, it is assumed that this beginning will lead to an endowment. An eventual endowment of \$100,000 would assure the permanency of the establishment.

If the income above indicated is guaranteed, Professor Jaggar, now stopping in Honolulu on his return from Japan, will at once enter into communication with Boston and undertake to locate and establish a station at Kilauea, beginning work at once. It is hoped to get the first instruments, which are now on hand in Boston, set up and in operation this summer. These include a seismograph, an equatorial telescope and a transit; other instruments, which will be obtained in Japan, the United States and Germany, are tromometers and strong-motion seismographs, microphones and pyrometers, and some special physical and photographic apparatus.

“Insect pests and plant diseases are as abundant in Hawaii as anywhere else, but in Hawaii, as elsewhere, these yield readily to the application of scientific methods of control. There are opportunities in Hawaii for farmers or market gardeners who will come here and undertake the cultivation of garden vegetables of better than the average quality. Cabbages, beans, sweet and irish potatoes, green corn, lettuce, parsley, tomatoes, beets and onions grow as well in Hawaii as anywhere else.”—*Jared G. Smith.*

BOARD OF AGRICULTURE AND FORESTRY.

Division of Forestry.

REPORT OF THE DIVISION OF FORESTRY FOR MAY.

Honolulu, Hawaii, June 2, 1909.

Board of Commissioners of
Agriculture and Forestry,
Honolulu.

GENTLEMEN:—I have the honor to submit the regular report of the Division of Forestry for the month of May.

NEW FOREST RESERVES.

The month of May 1909, saw several forest reserve projects brought to the point of completion. Following action by the Forestry Committee the Board approved the proposed reserves at a meeting held on May 18. On May 29 a public hearing was held by the Governor and the Board, at which the Governor announced that he would sign the necessary proclamations. These are now being prepared and will be signed within the next few days.

The new reserves are the "Mauna Kea Forest Reserve," 66,600 acres, all government land, in the District of Hamakua, Island of Hawaii, embracing the summit and upper slopes of Mauna Kea; the "Waihou Spring Forest Reserve," in the District of Hamakuapoko, Island of Maui, surrounding the Waihou Spring on the western slope of Mt. Haleakala, a total area of 84 acres, of which 74 is government land; the "Lihue-Koloa Forest Reserve," in the Districts of Puna and Kona, on the Island of Kauai, a total area of 29,260 acres, of which 12,945, or 44 per cent., is government land; the "Moloaa Forest Reserve," in the District of Koolau, also on Kauai, 5,670 acres, of which 3,615, or 64 per cent., belongs to the government; and a modification of the boundary of the Makawao Forest Reserve, in the District of Hamakuapoko, Maui, whereby the area of that reserve is increased from 1,796 to 1,830 acres.

The creation of these new reserves on Kauai completes the chain around the main mountain on that island, bringing Kauai to a point where forest management can be effectively applied when it becomes possible to undertake systematic forest administration.

TRIP TO KAUAI.

From May 18 to May 25 I was on the Island of Kauai, on a visit to the upper government land of Waimea, in the Na Pali-Kona Forest Reserve, to the experimental sub-garden and plant distribution nursery at Kalaheo, and to the planted forests at Lihue.

The especial object of the trip was to consult with Mr. W. D. McBryde, who has volunteered to look after the sub-garden at Kalaheo, in regard to the work to be done there. Satisfactory plans were made that should lead to the increasing usefulness of the Papahoolahola Station.

Incidentally it is only just to mention here the excellent work not only in tree planting, but in general in building up a worthy community life that is being done by Mr. McBryde among the homesteaders at Kalaheo. This little village is taking on the appearance of a prosperous settlement, a place of homes, the sort of thing that this Territory needs more than anything else. For his share in this work—and it is no small one—Mr. McBryde deserves high credit.

On the trip to Kauai I had the good fortune to be accompanied by Messrs. Coert Du Bois, Assistant District Forester of the U. S. Forest Service, Inspection District of California, and G. Frederick Schwarz of Boston, Massachusetts, a consulting forester in private practice. While in the woods and elsewhere there was opportunity to discuss with these gentlemen certain professional problems that now press for solution in Hawaii and to obtain from them expressions of opinion that are of value in the work in hand.

FOREST EXHIBIT FOR SEATTLE.

The transport Dix, sailing on May 25, carried the greater part of the forest exhibit prepared by this Division for the Hawaii Commissioners of the Alaska-Yukon-Pacific Exposition. Four cases of herbarium material, each containing 60 specimens of native or island grown plants and three open frames containing hand specimens of ninety Hawaiian and island grown woods are the chief features of the exhibit. The cases are of Koa; the specimens being properly labelled and arranged. Maps and charts illustrating the forest reserves also form a part of the exhibit. By an early steamer there will go forward several large transparencies of local forest scenes prepared by Mr. R. K. Bonine under my direction, to illustrate the forest work in the Territory.

TANTALUS FOREST.

During the latter part of the month the laborers from the Nursery and the Makiki Valley Station have put in some time, under

the direction of Mr. Haughs, in beating down the dead lantana along the roads and trails in the planted forest on Tantalus. Arrangements are also well in hand for removing the dead wood from this forest. Both these operations reduce the fire danger and add to the attractiveness of the forest as a park.

TREE PLANTING.

During the last few weeks many trees for forest planting started at the Government Nursery have been sent out to various parts of the Territory. Among these shipments may be mentioned 30,000 Ironwoods for Paauhau Plantation; 2,000 for Paaui, and 2,000 for Mr. John Hind in Kohala. About 2,000 Eucalypts—Swamp Mahogany—have been sent out to Mr. McBryde for the use of homesteaders at Kalaheo. These trees are sold at cost price under the coöperative agreement regularly maintained by this Division.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF SUPERINTENDENT OF ENTOMOLOGY FOR MAY, 1909.

Honolulu, Hawaii, June 1, 1909.

*Honorable Board of Commissioners of
Agriculture and Forestry,
Honolulu, T. H.*

Gentlemen:—Following is the statement covering the operations of the Division of Entomology during the month of May:

HONOLULU INSPECTION.

We boarded ~~37~~ vessels for the purpose of inspection and found live vegetable matter on 17 of them. This was acted upon as follows:

<i>Disposal with Principal Causes</i>	<i>Lots</i>	<i>Parcels</i>
Passed as free from pests.....	498	8044
Fumigated before releasing.....	21	22
Destroyed	11	15
Dipped in Bordeaux before releasing.....	2	2
Total examined	532	8083

ARTICLES DESTROYED AND CAUSES.

It is scarcely necessary to give in each report a list of articles destroyed and the causes for such action. This one is appended merely to show a typical series of causes leading to seizure and destruction.

Yams from the Orient—unmistakable evidence of fungus disease.

Sweet potatoes from the Orient—unmistakable evidence of fungus disease.

Bulbs of unknown plants from the Orient—maggots.

Lemons from United States (small lot)—scale bugs.

Fresh fruit from the Orient in immigrant's baggage—contrary to Board regulations.

Potatoes from United States (small lot)—badly infested with scab.

Horse radish from United States—infested with cabbage (?) maggots.

Sugar cane from China in immigrant's baggage—contrary to Board regulations and showing evidence of severe insect injury besides (preserved specimens for laboratory exhibit).

Cut flowers from United States—infested with aphids and red spider. (These were discarded by the owner and thrown on to wharf from ship deck. Were picked up by boys who proceeded to decorate themselves with them before the origin and infestation of the flowers was discovered.) Further comment seems unnecessary.

Among the possible pests killed by fumigation were aphids or plant lice on a variety of plants from the United States; two species of beetles (*Calandra* and *Bostrichid*?) on rice sample from the United States; two species of beetle and a centipede in a fern from the Orient by an immigrant; a complete colony of an unknown ant and larvae of a snout beetle in orchids from Singapore; about ten species of insects, all injurious, on one lot of orchids from Manila.

In connection with the Hawaiian Exhibit at the Alaska-Yukon-Pacific Exposition we fumigated two lots of coconut bunches and two huge rooms full of a large variety of plants in order to insure their admission to Seattle.

HILO INSPECTION.

On the work of Hilo inspection Bro. Matthias writes as follows:

"We had six foreign vessels.

"There were 93 lots and 1478 parcels, all of these were passed.

"Thirty-one parcels containing seeds and plants came through the mail. A few of these needed attention on account of aphids.

"Nine large packages containing bulbs and consigned to one party came from Florida. As they were not labeled they would

have passed without being inspected, but for one package being broken, contents were noted by the officials. There was, however, no intention on the part of the consignee to evade the law, but it shows how pests may be introduced through the mail, unless shippers of plants be compelled to label their wares."

MISCELLANEOUS.

By courtesy of Mr. Walter T. Swingle of the U. S. Department of Agriculture we received on the 12th from Mr. G. P. Rixford of San Francisco a splendid colony of the Smyrna fig insects. The insects arrived in excellent condition—alive and issuing—and were placed in Moanalua Gardens, the only place on these islands where capri trees are known to be in fruit. In connection with this shipment we received the following letter:

Washington, D. C., May 7, 1909.

Mr. Jacob Kotinsky,
Superintendent of Entomology and Inspector,
Honolulu, Hawaii.

Dear Sir:—I have directed that some mamme caprifigs with the winter generation of *Blastophaga* be sent you from our fig orchard at Loomis, California. I hope the insects will establish themselves in Hawaii and be able to live there.

I am also sending you a few copies of a special circular I prepared last winter on caprification.

I hope you may be able to get some people in Hawaii to take advantage of our offer to send cuttings of choice varieties of figs and caprifigs as a bonus for planting seedling figs.

Possibly some of your people would like to try the special foothill collection and perhaps if you could bring to the attention of the readers of the "Forester" the fact that caprifigs and seedlings are distributed free, a number would like to write for the circular. Of course, the cuttings and seedlings cannot be sent out before next winter.

Very truly yours,

WALTER T. SWINGLE,
Physiologist in Charge,
Plant Life History Investigations.

The copies of the special circular here referred to were distributed among likely applicants for fig cuttings in the hope that they would avail themselves of the offer. It is my personal belief that with an abundant supply of adequate varieties of capri trees the Smyrna fig should do well here in many localities and prove

a profitable crop. Being marketed in the dry state no extra transportation facilities are required and the American market can easily take care of all we can produce.

In order to give his work official status in foreign lands where such seemed indispensable to him Mr. Fred Muir, the entomologist in the service of the Hawaiian Sugar Planters' Association engaged in the search of parasites for the sugar cane borer, was on the 26th appointed Beneficial Insect Collector of this Board and Division. He is at present in New Guinea where he located a parasite of the borer and hopes to bring it here soon.

On the 13th of April the Board made two additions to our staff of Honorary Entomological Inspectors. They were made on the recommendation of the Maui County Board of Supervisors, and are as follows: Dr. W. B. Deas for the District and Port of Hana; Mr. William Robb for the District of Lahaina and Port of Kaanapali. These appointments should serve as additional safeguards against invasion by foreign pests. Letters giving detail instructions were sent these officers to guide them in their inspection duties.

Respectfully,

JACOB KOTINSKY,

Superintendent of Entomology and Chief Inspector.

"The production of garden vegetables for the local market is almost entirely in the hands of Chinese and Japanese gardeners. However, as it is a tendency on the part of most orientals to plant over and over again using seed of their own production, vegetables of improved varieties grown from imported seed find good sale in competition with the ordinary run of product at fair prices. The climatic conditions are such that anyone who wishes to take the trouble to do so, can grow almost any kind of garden vegetable excepting perhaps celery, peas, asparagus and cauliflower, in his own garden at all seasons of the year."—*Jared G. Smith.*

SISAL EXPANSION.

The Hawaiian Sisal Company is proceeding rapidly with its new plantation near Leilehua. The new method of growing the plants on cultivated land is expected to bring satisfactory results. Hitherto the idea has prevailed that the fibre is best when produced upon uncultivated sites and much interest therefore attaches to the experiment.

The Hawaiian Sisal Company ships about fifty bales of its product to San Francisco monthly, and is adding to its machinery in order to meet the demands of increased production.

THE MAUNA KEA FOREST RESERVE.

REPORT OF THE SUPERINTENDENT OF FORESTRY.

Honolulu, Hawaii, March 30, 1909.

Committee on Forestry,
Board of Commissioners of
Agriculture and Forestry,
Honolulu.

GENTLEMEN:—The subject of this report is the proposed setting apart of the upper slopes of Mauna Kea as a forest reserve.

Unlike most of the Hawaiian forest reserves this project is not concerned with water shed protection. Its purpose is to facilitate the systematic management of an area that can be used to better advantage for growing forest trees than for any other economic purpose. There is now on Mauna Kea a considerable stand of Mamani forest. At the higher elevations there is much land, now unproductive, that could well be planted with commercially valuable exotic trees. By setting apart the area as a forest reserve the existing forest can be made to be of greater service to the people of the Territory, while the afforestation of the upper slopes of the mountain will be facilitated.

DESCRIPTION OF THE AREA.

Mauna Kea, the highest mountain in the Territory of Hawaii, is situated in the District of Hamakua, Island and County of Hawaii. The elevation above the sea of its highest peak is 13,825 feet. The summit and the greater part of the sides of the mountain above the 7,500 foot contour line are included in the government land of Kaohe, an ahupuaa containing an immense area of waste land, in that besides the summit and upper slopes of Mauna Kea it also takes in a considerable portion of the north side of Mauna Loa.

Above a line encircling the mountain at the elevation of approximately 7,500 feet, the slopes of Mauna Kea may be classed as waste land. The herbage is too poor and uncertain to justify grazing and the land has now no other use. This fact, together with the desire to prevent their stock from straying up the mountain to join the bands of wild cattle, led the several ranches controlling the better portions of Kaohe and the other adjoining lands to build fences separating their upper paddocks from the area of low value above. Several such fences were built before the old leases expired. In 1907 when the leases on the govern-

ment land of Humuula and the better portions of Kaohe ran out and came to be renewed, provision was made for the extension of these mountain fences and for their up-keep during the term of the new leases. At the present time, with the exception of a stretch on the southwestern side of Mauna Kea, across the portion of Kaohe known as Kaohe 4, the mountain is wholly fenced off. It is expected that this stretch also will soon be leased, with a provision that the fence be completed. Further, negotiations are now in progress with the ranches abutting on Mauna Kea looking to a systematic campaign for the rounding up and capture and extermination of the wild cattle on the mountain.

When the new leases of Kaohe were made the waste land was retained by the Government, instead of being included as formerly with the productive areas below. This usage has now become a regular part of the land policy of the Territory. It is a step toward putting all the land to the use for which each tract is best adapted. For it leaves the control of land for which there is now no use in the hands of the Government against the time when some, now unforeseen, use may be found.

In the case of Kaohe it is now proposed that the land be devoted to the purpose of raising trees. The object of this report is to state the reasons that make this use advisable and to show how the setting apart of the area as a forest reserve will help bring about the desired results.

The section included in the proposed reserve may roughly be described as the upper slopes of Mauna Kea above an elevation of approximately 7,500 feet. The area is 66,600 acres.

USE OF KAOHE FOR FOREST PURPOSES.

The question of using the land of Kaohe for wood and timber production may be considered under two heads—the existing and the prospective forest.

The Mamane Forest.

Between the good grazing land and the elevation of about 9,000 feet, especially on the northern and western slopes of Mauna Kea, there is a fairly heavy stand of Mamane (*Sophora chrysophylla*). This forest is increasing through natural reproduction. The reason for the rapid spread of Mamane—which is a matter of the last decade—is not clear, but the fact remains to the advantage of the Territory. Mamane is a wood valuable for posts. Rightly managed there is likelihood that in time this forest can be made a source of revenue. One of the reasons for the setting apart of Kaohe as a forest reserve is that it will facilitate the proper handling of this forest.

Afforestation of the Upper Slopes.

Above the Mamane belt, between the elevations of from eight to eleven thousand feet, and in sections lower down where the Mamani forest is open and broken, there exists an excellent opportunity for the planting of commercially valuable exotic trees. The general conditions of soil, situation and climate at this elevation are sufficiently comparable to those on the mountains of Southern California to make it appear reasonable to expect that the kinds of trees that do well there can also be made to grow and thrive on Mauna Kea.

The planting of pines, spruces and firs on the upper slopes of Mauna Kea has been recommended by each of the professional foresters who have visited the islands: Mr. E. M. Griffiths, now State Forester of Wisconsin; Mr. W. L. Hall, of the U. S. Forest Service, and by me. Favorable conditions for tree planting also obtain on the upper slopes of Mount Haleakala on Maui, and on Mount Hualalai on Hawaii.

The U. S. Forest Service has shown its belief in the feasibility of the plan by allotting the sum of \$2,000 for experimental planting on Mauna Kea and Haleakala, during the present fiscal period. This money is now being expended under my direction as Collaborator in the Forest Service, in the inclosure and planting up of a number of experimental plots on these two mountains, located at varying elevations and having different conditions of aspect and exposure.

It is the intention at the start to plant in each inclosure a sufficient number of seedling trees—say 100 of each—of some eight kinds of coniferous trees (pines, spruces and firs) likely to do well. Later, it is expected that additional allotments will be secured from the Forest Service to continue the work. Eventually those trees that prove to be adapted to the situation can be more extensively planted, being then set out in such a way that in the end a belt of forest will be secured. Such a result is, of course, only to be expected after a considerable time. This makes the experiment one that is only likely to be undertaken by the Government. That it appears practical and practicable to the Forest Service is evidenced by the allotment already made.

At first it was felt that it would be sufficient if only the areas actually needed for the experimental plots were turned over by the Land Department for this use. But on consultation with the Land Commissioner it appeared that from an administrative standpoint it would be more satisfactory if all of this portion of Kaohae were transferred to this Board. This proposal met with the approval of the Governor. The present report is the next step in the matter.

RECOMMENDATION.

For the reasons above outlined—which may be summarized by the statement that the purpose of the reserve is to facilitate the management of the forest, present and prospective, on the upper slopes of Mauna Kea—I do now recommend that the Board of Agriculture and Forestry request the Governor to set apart, in accordance with law, as the “Mauna Kea Forest Reserve,” that portion of the non-agricultural, unleased government land of Kaohe, in the district of Hamakua, Island and County of Hawaii, within and above the boundary hereinafter described.

OFFICIAL DESCRIPTION.

Following is the technical description of the boundary of the proposed Mauna Kea Forest Reserve, prepared by the Government Survey Department as C. S. F. No. 2001, and accompanied by Registered Map No. 2060. (Here omitted because it appears in the official proclamation, printed elsewhere in this issue of the Forester.)

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

THE WAIHOU SPRING FOREST RESERVE.

REPORT OF THE SUPERINTENDENT OF FORESTRY.

Honolulu, Hawaii, April 15, 1909.

Committee on Forestry,
Board of Commissioners of
Agriculture and Forestry,
Honolulu.

GENTLEMEN:—I have to recommend the setting apart of a portion of the unleased government land of Makawao, also known as the Haleakala Tract, in the District of Hamakuapoko, Island and County of Maui, as a forest reserve, to be called the Waihou Spring Forest Reserve. The total area of this proposed reserve is 84 acres. Seventy-four acres is government land, the other ten belongs to the Haleakala Ranch Company.

The object of the proposed Waihou Spring Forest Reserve is to assist in protecting the sources of the Waihou Spring. Waihou is one of the very few permanent springs on the western slope

Mt. Haleakala. It appears in the Koaie Gulch at the foot of the Waihou Falls, near the southeastern corner of the government land of Makawao, where that land corners with Kalialinui and Makaehu. It is not far from Olinda; the elevation is about 3500 feet.

The spring is situated at the foot of the Waihou Falls, in the bed of the stream. In recent years it has been developed by tunneling and very possibly the normal flow might be further increased by a judicious extension of the existing tunnel shafts. But however that may be, the spring as it now stands is a highly important one that should be protected and maintained. Water from Waihou Spring is now piped to the lower portions of the Haleakala Ranch and used for watering stock.

From measurements taken by Mr. L. von Tempsky, the flow may be stated as ranging from 3,000 to over 72,000 gallons per 24 hours. The normal average flow is about 8,000 gallons per 24 hours. The flow from Waihou Spring responds quickly to heavy precipitation, which would seem to indicate that it is dependent, at least in part, on local drainage as a source of supply. It is with the idea of protecting the immediate surroundings of the spring and also of helping toward keeping up a regular flow, that the reserve is created.

At present the land recommended to be set apart is open grazing land. It is the intention to bring it under a forest cover through tree planting. The excellent growth of the Blue Gum trees at Olinda and of other neighboring groves started by the Haleakala Ranch Company, is evidence that such treatment is practicable. Just how much effect the reforestation of this small area will have on the flow of Waihou Spring is of course problematical, but by having the area set apart as a reserve the spring can be better protected, and the water from it more systematically handled. This is the more important as the next nearest permanent source of water to the south are the springs at Polipoli, some ten miles away.

The majority of the forest reserves in Hawaii are large, well wooded areas covering the watersheds of important streams. But it is also the policy of the Government to set apart the land immediately surrounding detached springs or water holes in districts where the sources of water are few, or where the springs are of special value. The Waiaha Spring Forest Reserve in North Kona, Hawaii, is such a locality. Waihou Spring is decidedly another instance. Held by the Government, with the land about the spring managed as a forest reserve, it is reasonable to expect that the water will be of greater use to the people than if the spring were leased along with the surrounding land.

The land of Makawao is not now under regular lease. The Haleakaal Ranch Company is at present using it under a tenancy at will, pending a more definite disposition of the tract, but this can be terminated at short notice. The proposed reserve can accordingly be set apart at once.

In the matter of fencing in and of planting the proposed reserve I recommend that the Commissioner of Public Lands be requested to have inserted in any leases that may be made of the adjoining parts of the Haleakala tract, the requirement that a fence be built and maintained on the reserve boundary. On the south side, the wall of the gulch is a sufficient natural barrier. The mauka side is now protected by a fence on the boundary line between the Government land and the private land of Kalialinui. In regard to tree planting I believe an arrangement with the Haleakala Ranch Company can be arrived at without difficulty, whereby the reserve could be planted at comparatively small expense. I should favor the expenditure of Territorial funds, under the Conservation Act, for the planting of this reserve and the similarly situated section above the Polipoli Springs, further along the same slope of Haleakala. This is, however, a detail that does not require action by the Board at this time.

RECOMMENDATION.

For the reasons above set forth I do now recommend that the Board request the Governor to set apart, in accordance with law, as the Waihou Spring Forest Reserve, that portion of the government land of Makawao, officially described by the Survey Office, (C. S. F. 2003, accompanied by Government Survey Registered Map No. 2394) as follows: (Here omitted because the description also forms a part of the official proclamation, printed elsewhere in this issue of the Forester.)

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

MODIFICATION OF THE MAKAWAO FOREST RESERVE.

REPORT OF THE SUPERINTENDENT OF FORESTRY.

Honolulu, Hawaii, May 11, 1909.

Board of Commissioners of
Agriculture and Forestry,
Honolulu.

GENTLEMEN:—This report deals with a proposed modification of the boundary, and consequent slight enlargement, of the Makawao Forest Reserve, in the District of Hamakuapoko, Island of Maui.

The Makawao Forest Reserve, consisting of 1,796 acres of unleased government land, was set apart by proclamation of Governor Frear on April 21, 1908. The object of the reserve is to

afford permanent protection to the forest cover on the watershed on the windward side of Maui, of which area the Makawao Forest Reserve is the extreme western section. The Makawao Reserve was made to round out and complete the area of forest already included in the Koolau Forest Reserve.

The Makawao Forest Reserve was approved by the Board of Agriculture and Forestry at a meeting held on July 29, 1907. The reports and resolutions in regard thereto were published in the Hawaiian Forester and Agriculturist for August, 1907 (Vol. IV, No. 8, pp. 241-245).

The purpose of the present report is to recommend a change of boundary whereby the reserve can be better protected. When the boundary was originally laid out it was made, on the western side of the tract, to follow the "inside" or eastern bank of the Kahakapao Gulch, from a point near Olinda to a point nearly abreast of Pali o ka Moa Falls. This was done because it was then expected that homestead lots would soon be laid out fronting on the Haleakala Mountain Road and running back to the Gulch, the bottom of which it was thought desirable to include in the lots, as adding to their value from giving water rights, although this stream has only an intermittent flow. A better acquaintance with the land showed that the opening up of lots in this section would be inadvisable. Consequently there is now no objection to changing the boundary to the outside or western bank of the Gulch, which is the natural place for it, because owing to steep palis all the way down the stream a few short stretches of fence on this bank will protect all the land within. The eastern bank does not afford the natural barriers that the outer side of the Gulch does. The present area of the Makawao Forest Reserve is 1,796 acres; the area with the boundary changed as is here proposed is 1,830 acres.

This change of boundary meets with the approval of Governor Frear and of the Land Commissioner. It was in fact made at the direction of the Governor.

For the reasons, then, that the proposed change of boundary will make it possible to protect and administer the reserve to better advantage, I do now recommend that the Board approve this report and request the Governor to modify the existing boundary and to set apart as the Makawao Forest Reserve the area within the boundary hereinafter set forth.

The official revised description of the Makawao Forest Reserve, prepared by the Government Survey Office, as C. S. F. 2002, and accompanied by Registered Map No. 2394, is as follows: (Here omitted because the description also forms a part of the official proclamation, printed elsewhere in this issue of the Forester.)

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

THE LIHUE-KOLOA AND THE MOLOAA FOREST RESERVES ON KAUAI.

REPORT OF THE SUPERINTENDENT OF FORESTRY.

Honolulu, Hawaii, April 22, 1909.

Committee on Forestry,
Board of Commissioners of
Agriculture and Forestry,
Honolulu.

GENTLEMEN :—I have the honor to submit a report with recommendations in regard to the creation of two additional forest reserves on the Island of Kauai.

The areas in question are (1) parts of the mountain section back of and above the McBryde, Koloa and Lihue Sugar Plantations, and (2) the area on the north slope of the Anahola Ridge, together with the adjoining lands to the west above Kilauea. These projects should be termed respectively the "Lihue-Koloa Forest Reserve" and the "Moloaa Forest Reserve." The reservation of these two areas will complete the forest reserve system on Kauai, with the possible exception that a small reserve might well be made to include the steep, partially forested ridge south of Lihue, of which Haaupu is the chief peak.

The object of both proposed reserves is the protection of important watersheds. Both contain government and privately owned land. In both the greater part of the private land has been for some years and is now treated as a private forest reserve. But to get the best results in the long run the entire area should be set apart officially, so that it can more easily be brought under a systematic form of forest management with one central control.

THE LIHUE-KOLOA FOREST RESERVE.

The proposed Lihue-Koloa Forest Reserve extends from the eastern boundary of the Na Pali-Kona Forest Reserve to the southern boundary of the Kealia Forest Reserve. It takes in the entire southeastern side of the central mountain mass of the Island of Kauai, in the Districts of Kona and Puna, embracing all the area above the plantations that still remains in forest, or which ought to be brought back under a forest cover for the better protection of the streams that are needed for the irrigation of the lower lying agricultural lands.

Lands Included.

The proposed reserve contains an aggregate total area of 29,260 acres. Of this 12,945 acres, or 44 per cent., is government land.

The government land is in two tracts: Kalaheo, with 1,275 acres within the forest reserve, unleased land that can be set apart at once; and Waihua, 11,670 acres in the reserve, under lease to the Lihue Sugar Plantation Company until October 1, 1917. Both were crown lands.

The private lands, portions of which are within the reserve, are owned as follows:

District of Kona.

<i>Land.</i>	<i>Owner.</i>	<i>Area Acres.</i>
Hanapepē (a part of the ili of Koula)	Messrs. Gay & Robinson	10
Wahiawa	McBryde Sugar Company	2,075
Lawai	McBryde Sugar Company	350
Koloa	Mrs. V. Knudsen (leased to Koloa Sugar Company)	980
		<hr/> 3,415

District of Puna.

<i>Land.</i>	<i>Owner.</i>	<i>Area Acres.</i>
Haiku	Mr. G. N. Wilcox	2,900
Hanamaulu	Lihue Sugar Plantation Co.	9,580
North Olohena	Makee Sugar Company	150
Waipouli	Makee Sugar Company	270
		<hr/> 12,900
Brought forward		3,415
		<hr/> 16,315

Object.

The purpose of the Lihue-Koloa Forest Reserve is, as has already been stated, watershed protection. From west to east some of the more important streams that rise within the boundaries of the proposed reserves are the Wahiawa, Lawai, Koloa, Huleia Rivers, and the North and South Forks of the Wailua River. The water from all of these streams is used for irrigation and other economic purposes. The regular and sustained flow of these streams depends on the preservation of a forest cover on their watersheds. As irrigation is essential to the successful development of the lower lands for sugar or other profitable crops it follows that the permanent protection of this forest area is a direct economic necessity for the Island of Kauai. This reserve belongs, of course, to the "protection forest" class. It should be so managed that the forest cover is kept permanently intact.

Private Reserves.

So well is this understood that a very large percentage of the area which it is now proposed be officially recognized as the Lihue-Koloa Forest Reserve has for many years been protected from cattle and treated as private forest reserves by the plantation companies owning or controlling the lands.

The Lihue Sugar Plantation Company was the pioneer in this work. Ever since 1894 that company has maintained at its own expense a forest fence from the boundary of its lands, near the Kilohana Crater, across Hanamaulu and Wailua to a natural barrier near Hanahanapuni Hill. No cattle have been allowed above this fence and the forest has been protected from fire and trespass.

This is not the place for a discussion of forest planting but even the briefest description of the forest conditions at Lihue would be incomplete without mention of the excellent work that has been done by the Lihue Plantation in forest planting. The first plantation to take up systematic tree planting on a large scale—the work began in 1882—over 1,100 acres have now been planted with trees of economic value, and the work is actively going on. This is a record of which any company might well be proud. The value of the planting that has been done will become more and more apparent as time goes on, for with the steadily increasing prices of all wood products those companies that have forest plantations of their own will be in much better case than those that have to depend altogether on outside sources of supply.

Following the lead of the Lihue Plantation Company the McBryde Sugar Company and Mr. G. N. Wilcox have both built and maintained forest fences across their mauka lands and have kept cattle out from the section so reserved. The McBryde fence was built in 1905; the section above Grove Farm was set apart in 1906.

Although not in connection with the forest reserve, mention should also be made here of the tree planting now in progress on Grove Farm and on the lands of the McBryde and the Koloa plantations. Excellent work is also being done on the lands near the McBryde homestead by Mr. Walter D. McBryde. All of this tree planting is of distinct importance, for while it helps most directly those who start the trees it is also of indirect benefit to the whole community.

The Boundary.

As the makai boundary of the proposed Lihue-Koloa Forest Reserve the existing forest fences, with the natural barriers along the way, have been chosen as being the best line that could be selected. Starting at Hanapepe the boundary follows the forest fence of the McBryde Sugar Company, except that it takes

in a little more of the government land of Kalaheo that is actually protected by fence at present. Across Haiku the storm-water ditch makes a good natural barrier with some additional fencing. From Kilohana crater to Hanahanapuni the boundary is made to follow the pole line of the Kauai Electric Company. This line is sufficiently near the Lihue Plantation Company's forest fence to make unnecessary the exact location of the fence by survey. From Hanahanapuni to the boundary of the Kealia Forest Reserve the boundary is an arbitrary line across country, but it is one that could be followed approximately by a fence. The section of Olohena and Waipouli thus included in the reserve is land that should be got back under a forest cover. It is an area of broken topography, small flats so much cut up by gulches and ravines as to make it of use only for grazing and for that it is of only indifferent value. It is distinctly a section that should be reforested. In time this may be accomplished.

The remainder of the boundary follows the ridges and the crest of the mountain back to the point of beginning. In this way the proposed reserve touches each of the other reserves already set apart on Kauai, for all meet on the mountain near Mt. Waialeale.

The representatives of the several private owners have expressed themselves as being in favor of the recognition of the present forest fences as the permanent boundaries of the forest reserve, and have agreed to the erection on their lands of forest reserve monuments officially marking the line. But it is distinctly understood that by this action no rights as to title or control of the land are surrendered to the Government. Later it is hoped that some satisfactory form of agreement can be worked out, under which the private owners and the Territorial forest officials can coöperate more closely in giving to the forest the care that to get the best results it ought to have. The creation of the reserve and the setting apart of the government lands therein is a step toward this end.

RECOMMENDATIONS.

For the reasons above set forth I do now recommend that the Board approve this project and request the Governor to *create*, in accordance with law, the area hereinafter officially described, as the Lihue-Koloa Forest Reserve, and to *set apart* as portions of the said reserve, those parts of the government lands of Kalaheo and Wailua that lie within the reserve boundary. Kalaheo, not being under lease can be definitely set apart at once. Wailua can be set apart subject to the existing lease, the full reservation to take effect automatically on its expiration, October 1, 1917.

Following is the official description of the boundary of the proposed Lihue-Koloa Forest Reserve, prepared by the Territorial Government Survey Office, as C. S. F. No. 1966 and accompanied

by Government Survey Registered Map No. 2375: (Here omitted because it also forms part of the official proclamation, printed elsewhere in this issue of the Forester.)

AREAS.

District of Kona.

<i>Lands.</i>	<i>Acres.</i>	
Hanapepe	10	
Wahiawa	2,075	
Kalaheo (government)	1,275	
Lawaii	350	
Koloa	980	4,690
	<hr/>	

District of Puna.

Haiku	2,900	
Hanamaulu	9,580	
Wailua (government)	11,670	
North Olohena	150	
Waipouli	270	24,570
	<hr/>	<hr/>
Total Area		29,260

THE MOLOAA FOREST RESERVE.

REPORT OF THE SUPERINTENDENT OF FORESTRY.

The proposed Moloaa Forest Reserve is in the District of Koolau. It consists of the upper slopes on the north side of the Anahola Ridge and the area above the agricultural land at the northeast end of the main mountain mass accupying the center of the Island of Kauai; more particularly the slopes below the peaks of Malamalama iki and Namahana. The total area of this proposed reserve is 5,670 acres. Of this 3,615 acres, or 64 per cent., is government land.

The object of this reserve is to protect and preserve the forest on the steep slopes that can be used to better advantage for growing forest than for any other economic purpose. There is not much water to be obtained from the valleys on these slopes, but what there is, is of high value. The streams of most importance are the Moloaa Stream and the Kilauea River.

In view of the need of water for the development of the lower lands and of the possibilities for the extension of the area under a high state of cultivation, were it found feasible to secure an

additional supply, it behooves the Government and those interested to do all that is reasonable toward safe-guarding and increasing the local sources of supply. With the steep gradient and the liability of excessive erosion when the forest cover is removed, it becomes important that this area should be protected. The setting apart of this section as a forest reserve is a step toward efficient protection and reasonable care. Like the other forest reserves on Kauai the Moloaa Reserve belongs to the "protection forest" class. It should be treated accordingly.

Lands Included.

The lands within the proposed Moloaa Forest Reserve fall readily into four classes: (1) Those owned by the Moloaa Hui-Moloaa, Papaa and Aliomanu, in all 144 acres; (2) small portions of two private grants, 6 acres; (3) the lands controlled by the Kilauea Sugar Plantation Company, 1,905 acres; and (4) the government lands, 3,615 acres.

The government lands comprise 64 per cent. of the area of the reserve. They are the two lands of Papaa, 1,425 acres, and Papaa-Moloaa, 2,190 acres. The latter land is not under lease. It can definitely be set apart at once. Papaa is under lease to the Kilauea Sugar Plantation Company. The lease expires February 10, 1912. The reservation of this land will be subject to this lease and will not go in full effect until its expiration.

The portions of the Hui lands included in the reserve—a small area—are the extreme mauka ends of low lying lands that are now used for grazing. As the reserve line is drawn as near as possible to the foot of the pali on the north side of the Anahola Ridge, fencing is unnecessary. The inclusion in the reserve of this area of private land does not deprive the owners of any rights, for the slopes are so steep that the portion of the Hui lands so included is of little or no use.

The few acres of private grants included in the reserve result from carrying the boundary line through between the points that could most conveniently be used as signal stations. Were it found necessary these areas could easily be fenced out of the reserve.

The lands owned or controlled by the Kilauea Sugar Plantation Company include portions of the three private lands of Kilauea, Kahili and Pilaa, and the leasehold until 1912 of Papaa (government). The boundary of the reserve across these lands was fixed after conference with the late Mr. F. Scott, the former manager of the Kilauea plantation. It has been approved by the Directors of the Kilauea Plantation Company.

Previously a line lower down had been suggested by Mr. Scott's predecessor, Mr. Andrew Moore, but this was afterwards abandoned as impracticable. The line as now located will, it is believed, serve the necessary purpose and sufficiently protect the

upper land. Before this portion of the reserve becomes effective considerable fencing is required. This it is the intention of the plantation to undertake in due course.

To the west and on the mauka side the proposed Moloaa Reserve adjoins respectively the Halelea Forest Reserve and the Kealia Forest Reserve, both created some time ago. It rounds out the block of forest land on the north side of Kauai and completes the chain of reserves around Mt. Waialeale.

RECOMMENDATION.

For the reasons given above I do now recommend that the Board approve this project and request the Governor to *create* in accordance with law, as the Moloaa Forest Reserve, the area hereinafter officially described, and to *set apart* as portions thereof of the government lands of Papaa and Papaa-Moloaa, the former subject to the existing lease upon it, the latter definitely, at once.

Following is the official description of the proposed Moloaa Forest Reserve prepared by the Territorial Government Survey Office as C. S. F. 1961, accompanied by Government Registered Map No. 2375. (Here omitted because it also forms part of the official proclamation, printed elsewhere in this issue of the For-ester).

AREAS.

Kilauea	1,390	acres, more or less		
Kahili	475	"	"	"
Papaa (government land)	1,425	"	"	"
Papaa (Grant 528)	5	"	"	"
Pilaa	40	"	"	"
Lepeuli (Grant 757)	1	"	"	"
Papaa-Moloaa (government land)	2,190	"	"	"
Moloaa (Hui lands)	13	"	"	"
Papaa (Hui lands)	6	"	"	"
Aliomanu (Hui lands)	125	"	"	"

Total area 5,670 acres, more or less

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

NEW PINEAPPLE COMPANY.

The Kahaluu Pineapple Company, with its subsidiary Hawaiian Cannery Company, has been recently incorporated with an authorized capital of \$100,000.

KAUAI ONION CROP.

A letter recently appeared in the *Pacific Commercial Advertiser* from Mr. George H. Fairchild describing and giving certain cultural directions of an onion crop lately grown on Kauai. THE FORESTER has repeatedly urged the local growth of such crops and heartily supports the writer of the letter referred to in his advocacy of home production. The consumption in the Hawaiian Islands of imported vegetable and dairy produce, which could be profitably grown here, is very large and steadily increasing, and the neglect of our island agriculturists to make a respectable attempt to supply our markets is either a reflection upon their enterprise or a testimony that other fields of investment are more promising. That the latter idea influences many growers there is little doubt, although the profits to be realized from the growing of choice vegetables, upon investigation, appear to be fully as large as those from most other agricultural enterprises, and it possesses the additional merit of bringing a return in a far shorter time than pineapples, rubber, sisal and most of the other established industries. The present opportunity to establish a small market gardening company to supply good staple vegetables of the kinds which at present figure so conspicuously on our import lists, is one which should not long be neglected. At the same time, to the hundreds of owners of unproductive small lots in and around Honolulu by means of an exceedingly small outlay for the purpose of growing one vegetable crop, such as that suggested, a means is held out to bring a quick return out of all proportion to the sum invested. May Mr. Fairchild's letter be instrumental in inciting many small growers to turn their attention to this opportunity.

The letter alluded to is here given in full:

Editor Advertiser:—I am sending you by this mail an onion raised in my garden which weighs one pound. While this, of course, is much larger than the average, on the whole, the small patch in the garden produces fine onions at the rate of fifteen tons per acre. One quarter acre in another place produced at the rate of twelve tons per acre, but some peculiar rot destroyed half of them.

I find that Honolulu uses fifty tons of onions a month, say six hundred tons a year so that forty to sixty acres of onions should pay some farmer near Honolulu a very handsome profit if he can do as well as I have in my experiment.

The seed was imported from Portugal, and I would advise the importing of all onion seed from there as I have had no success with seed from the best houses in the States and think this may be due to the fact that the climate in Portugal where this seed comes from is more like our own. This peculiarity I find is also true of other vegetables. After some years experimenting with various varieties of seeds, I can now raise in my garden from

September until July all of the regulation vegetables, and less than an eighth of an acre keeps my own and sometimes the neighbor's family in vegetables for nine months of the year.

During the three warmest summer months I usually experience more trouble from pests and heat, so find it more profitable to fallow the garden and plow in manure at the rate of ten to twenty tons per acre. Referring to the onions, would advise planting the onions for market in October, and then they will come in to market about January to May during which time the price is highest.

As you have been a small farmer advocate I have addressed you in this matter thinking you may know of some one in the vicinity of Honolulu who might make a good thing on a crop of onions. Tell him to keep his onions in the ground until the tops die and then dry them out thoroughly on an absolutely dry surface exposed to good warm sunlight with no chance of dew or rain wetting them above or below during the drying process. Tell him to prepare his soil with well rotted manure at the rate of ten to twenty tons per acre before transplanting. For three months we have bought no onions from Honolulu, all the trade in this district having been supplied with the results of this experiment. If this information will aid any citizen in making a start in supplying the Hawaiian market with home grown onions, it will have been worth while.

Yours truly,

GEO. H. FAIRCHILD.

Kealia, Kauai, June 10, 1909.

"There are opportunities for farmers to come here and undertake the cultivation of potatoes, onions and cabbages, very large amounts of each of these vegetables being brought to the islands every year from the Mainland, or even from Australia. The success of market gardening enterprises of this character would depend on the ability of the farmer to produce a uniform supply at all seasons of the year, and the climatic conditions are such that this is entirely practicable. The local consumer prefers island products to those which are brought in from the Mainland. About \$150,000 worth of vegetables are shipped into Honolulu every year, the larger portion of which could be produced locally, and undoubtedly sometime will be, whenever the producer undertakes to supply crops of any one of these vegetables in succession throughout the year."—*Jared G. Smith.*

NATIONAL IRRIGATION CONGRESS,

The following concise data concerning the work of the National Irrigation Congress, which will have its seventeenth session in Spokane during August, is of particular interest at this time:

The National reclamation act was passed in 1902. At that time there were in the government's name, in the 16 states affected, 600,000,000 acres of arid land, of which it was estimated possible to reclaim sufficient to support 50,000,000 people. By 1911 the Reclamation Service will have reclaimed nearly 2,000,000 acres, at an estimated cost of \$70,000,000. There are 40,000,000 acres of arid lands susceptible to reclamation by irrigation. The construction cost of the reclamation works is returned to the government from the sale of lands, the proceeds to be again used in furthering irrigation development.

HAWAIIAN PINEAPPLE ASSOCIATION.

The Hawaiian Pineapple Association held its annual meeting on Saturday, June 19. The reports presented were very encouraging. It was resolved to continue the extensive advertising campaign which has been so successful. The demand for Hawaiian pines that has resulted has been most encouraging and ensures the future prosperity of the industry. The officers of the past year were re-elected.

VOLUME I OF THE FORESTER.

Volume I of the Hawaiian Forester, bound and in perfect condition, is offered in exchange for subsequent unbound numbers. Readers desirous of securing this important volume, which is long out of print, are requested to notify the Editor of what exchange they can offer.

HAWAIIAN PINES AT SEATTLE.

So popular have the Hawaiian pineapples become among the visitors at Seattle Exposition that an additional consignment of five hundred cases has recently been dispatched. It is computed that about one thousand visitors daily are tasting the luscious Hawaiian pineapple. These are from all parts of the Union so the prospects of an enormous increase in the market for them may early be anticipated.

SEATTLE EXHIBIT.

The reports from Seattle state that the Hawaiian exhibit is attracting considerable attention and is favorably commented upon.

BY AUTHORITY.

MAUNA KEA FOREST RESERVE.

PROCLAMATION OF FOREST RESERVE IN THE DISTRICT OF
HAMAKUA, ISLAND AND COUNTY OF HAWAII.

Under and by virtue of the authority vested in me by the provisions of Chapter 28 of the Revised Laws of Hawaii, as amended by Act 65 of the Session Laws of 1905, and by Act 4 of the Session Laws of 1907, and of every other power me hereunto enabling, I, WALTER F. FREAR, Governor of Hawaii, having held the hearing of which notice has been duly given as in said acts provided, do hereby SET APART as a Forest Reserve, to be called the "MAUNA KEA FOREST RESERVE," that portion of government land in the District of Hamakua, Island of Hawaii, known as Kaohe, embracing and including the upper slopes and summit of Mauna Kea, above the elevation of approximately 7,500 feet, and containing an area of 66,600 acres, more or less, in the District of Hamakua, Island and County of Hawaii, Territory of Hawaii, more particularly described by and on a map made in February, 1909, by the Government Survey Department, of the Territory of Hawaii, which said map is now on file in the said Survey Department, marked "Registered Map Number 2060" and "Mauna Kea Forest Reserve," and a description accompanying the same, numbered C. S. F. 2001, which said description now on file in the said Survey Department, is as follows:

MAUNA KEA FOREST RESERVE.

Including Portion of the Government Land of Kaohe V, Kaohe, Hamakua, Hawaii.

Beginning at Government Survey Trig. Station "Kole South" (marked by on set stone and ahu) on hill of that name on the South side of Mauna Kea and on the boundary of Humuula and Kaohe, the true azimuth and distance to "Aahuwela" Trig. Station being $234^{\circ} 44' 30''$ 22851.8 feet and to "Puu Oo" Trig. Station being $307^{\circ} 04' 13''$ 11113.9 feet, as shown on Government Survey Registered Map No. 2060, and running by the following azimuths:

1. $99^{\circ} 56' 58''$ 13798.5 feet along land of Humuula to "Lepeamoia" Trig. Station (marked by a + on set stone and ahu);
2. $39^{\circ} 58' 42''$ 4875.8 feet along land of Humuula to the East corner of Kaohe IV (Brown Lease, 18,000 acres), from which the true azimuth and distance to "Omaokoili" Trig. Station (marked on solid imbedded bomb) is $39^{\circ} 58' 42''$ 15,000.0 feet;
3. $115^{\circ} 10'$ 37,700.0 feet along Kaohe IV (Brown Lease) to the East corner of Kaohe III-B (General Lease 594 to A. W. Carter, Guardian);
4. $161^{\circ} 10'$ 19,380.0 feet along Kaohe III-B (General Lease 594 to A. Carter, Guardian) to "Puu Laau" Trig. Station on the boundary of Paauhau, from which the true azimuth and distance to "Noiaohae" Trig. Station is $135^{\circ} 24' 50''$ 43,544.0 feet;
5. $234^{\circ} 10'$ 27,900.0 feet along land of Paauhau to "Kemole" Hill;
6. $244^{\circ} 35'$ 15,060.0 feet along Kaohe III-A (General Lease 594 to A. Carter, Guardian) to a point directly South of "Kaluamakua" Trig. Station;
7. $255^{\circ} 20'$ 15,760.0 feet along Kaohe III-A (General Lease 594) to the Hanaipoe Gulch at the Southeast corner of the land of Kalopa;
8. $293^{\circ} 45'$ 13,660.0 feet along Kaohe II-B (General Lease 623 to Kukaiau Plantation Company, Limited), to "Puu Kea" Trig. Station at the Southwest corner of the land of Kohalalele, from which the true azimuth and distance to "Apakuie" Trig. Station is $154^{\circ} 02' 40''$ 16,150.0 feet;

254° 10' 5800.0 feet along the head of the land of Koholalele to a waterhole on the mauka side of "Puu o Kihe" Trig. Station;

319° 00' 5200.0 feet along the head of the land of Kukaiau to its South corner just mauka of Iolehaehae;

286° 50' 5400.0 feet along Kaohe VI (General Lease 624 to the Kukaiau Plantation Company, Limited) to a place called Waikulukulu, a point in Kaula Gulch at the West base of the hill Puu Kalepa;

34° 30' 9000.0 feet along the land of Humuula to Holei;

19° 42' 20" 26368.0 feet along land of Humuula to Kaupakuhale Hill;

13° 10' 17260.0 feet along the land of Humuula to the point of beginning.

Area 66,600 Acres.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the Territory of Hawaii to be affixed.
Done at the Capitol in Honolulu, this 5th day of June,
A. D. 1909.

W. F. FREAR,
Governor of Hawaii.

By the Governor,

E. A. MOTT-SMITH,
Secretary.

WAIHOU SPRING FOREST RESERVE.

PROCLAMATION OF FOREST RESERVE IN THE DISTRICT OF HAMAKUAPOKO, ISLAND AND COUNTY OF MAUI.

Under and by virtue of the authority vested in me by the provisions of Chapter 28 of the Revised Laws of Hawaii, as amended by Act 65 of the Session Laws of 1907, and by Act 4 of the Session Laws of 1907, and of every other power me hereunto enabling, I WALTER F. FREAR, Governor of Hawaii, having held the hearing of which notice has been duly given as in said acts provided, do hereby RECOMMEND AND APPROVE as a Forest Reserve, to be called the "Waihou Spring Forest Reserve," those certain pieces of government and privately owned land in the District of Hamakuapoko, Island of Maui, which may be described as surrounding and including the Waihou Spring which is situate at an elevation of approximately 3500 feet, on the western slope of Mount Haleakala, and containing an area of 84 acres, in the District of Hamakuapoko, Island and County of Maui, Territory of Hawaii, more particularly described by and on a map made in March, 1909, by the Government Survey Department of the Territory of Hawaii, which said map is now on file in the said Survey Department, marked "Registered Map Number 2394" and "Waihou Spring Forest Reserve," and a description accompanying the same, numbered C. S. F. 2003, which said description now on file in the said Survey Department, is as follows:

WAIHOU SPRING FOREST RESERVE.

Portions Government Tract of Haleakala, Makawao, Hamakuapoko District, and Private Land of Makachu, Kula District, Island of Maui.

Beginning at the galvanized iron pipe marking the Government Survey Tertiary Trig. Station "Kalua Alaea," the coördinates of said station referred to Government Survey Primary Trig. Station "Pihiolo" being 6597.5 feet South and 3357.6 feet East, as shown on Government Survey Registered Map Number 2394, and running by true azimuths:

1. Along the edge of the pali to a mamane post, the direct azimuth and distance being: 91° 23' 700.0 feet;

2. 23° 56' 908.0 feet across the Koaie Gulch to a mamane post near the West edge of said gulch in the land of Makaehu;
 3. 311° 09' 1300.7 feet along near the edge of Koaie Gulch to a mamane post;
 4. 303° 30' 1248.0 feet to a mamane post at Kakakalenalena, a point on top of small waterfall in the Koaie Gulch, said point being the intersection of the boundaries of the lands of Kalialinui and Makaehu and the Haleakala Tract;
 5. 240° 31' 550.0 feet along land of Kalialinui to a + on Eucalyptus tree;
 6. 241° 45' 607.0 feet along land of Kalialinui to a + on Eucalyptus tree;
 7. 138° 42' 933.8 feet along remainder of Haleakala Tract to a mamane post;
 8. 129° 06' 1740.0 feet along remainder of Haleakala Tract to the point of beginning.
- | | |
|---|------------|
| Area in Haleakala Tract (Government)..... | 74.0 acres |
| Area in land of Makaehu (Private)..... | 10.0 acres |

Total area 84.0 acres

And, as provided by law, I do hereby SET APART as a part of the Waihou Spring Forest Reserve that portion of the government land known as Makawao, and also sometimes as the Haleakala Tract, that lies within the metes and bounds of the above described Waihou Spring Forest Reserve.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the Territory of Hawaii to be affixed.
Done at the Capitol in Honolulu, this 5th day of June,
A. D. 1909.

W. F. FREAR,
Governor of Hawaii.

By the Governor,
E. A. MOTT-SMITH,
Secretary.

MAKAWAO FOREST RESERVE.

PROCLAMATION OF MODIFICATION OF THE MAKAWAO FOREST RESERVE BOUNDARY IN THE DISTRICT OF HAMAKUAPOKO, ISLAND AND COUNTY OF MAUI.

Under and by virtue of the authority vested in me by the provisions of Chapter 28 of the Revised Laws of Hawaii, as amended by Act 65 of the Session Laws of 1905, and by Act 4 of the Session Laws of 1907, and of every other power me hereunto enabling, I, WALTER F. FREAR, Governor of Hawaii, having held the hearing of which notice has been duly given as in said acts provided, do hereby MODIFY the boundary and area of the Makawao Forest Reserve in the District of Hamakuapoko, Island of Maui, created and set apart by proclamation of the Governor of Hawaii, on April 21, 1908, by certain changes in the location of the boundary, and do now and hereby SET APART as a forest reserve, to be called the "Makawao Forest Reserve" that certain piece of government land in the District of Hamakuapoko, Island of Maui, known as a part of the land of Makawao or Haleakala Tract, lying on the Northwestern slope of Mt. Haleakala, bounded on the North and East by the Koolau Forest Reserve, on the South by the land of Kalialinui, and on the West and Northwest by the remainder of the land of Makawao, and containing an area of 1830 acres, more or less, in the District of Hamakuapoko, Island and County of Maui, Territory of Hawaii, more particularly described by and on a map made in May, 1909, by the Survey Department of the Territory of Hawaii, which said map is now on file in the said Survey Department, marked "Registered Map Number 2394" and "Makawao Forest Reserve,

laui," and a description accompanying the same, numbered C. S. F. 2002, which said description now on file in the said Survey Department, is as follows:

MAKAWAO FOREST RESERVE.

Portion of Haleakala Government Tract, Makawao, Hamakuapoko, Maui.

Beginning at a + on a rock on the Pali-o-ka-Moa Falls, said marked rock being on the boundary of this tract and the land of Haiku, the coördinates of which point referred to Government Survey Trig. Station "Piio-olo" are 3773.9 feet South and 7410.0 feet East, as shown on Government Survey Registered Map No. 2394. and running by true azimuths:

1. $325^{\circ} 55' 30''$ 17866.5 feet along the land of Haiku to mamane post on top of Puu Kakae;
2. $97^{\circ} 37'$ 6043.0 feet along the land of Kalialinui;
3. $136^{\circ} 00'$ 924.0 feet along remainder of Haleakala Tract;
4. $114^{\circ} 40'$ 617.0 feet along remainder of Haleakala Tract;
5. $164^{\circ} 14'$ 2038.0 feet along remainder of Haleakala Tract;
6. $97^{\circ} 43'$ 3615.0 feet along remainder of Haleakala Tract. and crossing the Kahakapao Gulch, to a point on the West edge of same;
7. Thence along the West edge of the Kahakapao Gulch to a Forest Reserve Monument, the direct azimuth and distance being: $160^{\circ} 00'$ 2732.3 feet;
8. Thence still along the West edge of the Kahakapao Gulch to a Forest Reserve Monument, the direct azimuth and distance being: $172^{\circ} 44'$ 4072.3 feet;
9. $214^{\circ} 32'$ 4882.0 feet, crossing the Kahakapao Gulch, and to the point of beginning.

Area 1830 Acres.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the Territory of Hawaii to be affixed.
Done at the Capitol in Honolulu, this 5th day of June,
A. D. 1909.

W. F. FREAR,
Governor of Hawaii.

By the Governor.

E. A. MOTT-SMITH,
Secretary.

LIHUE-KOLOA FOREST RESERVE.

PROCLAMATION OF FOREST RESERVE IN THE DISTRICTS OF PUNA AND KONA, ISLAND AND COUNTY OF KAUAI.

Under and by virtue of the authority vested in me by the provisions of Chapter 28 of the Revised Laws of Hawaii, as amended by Act 65 of the Session Laws of 1905, and by Act 4 of the Session Laws of 1907, and of every other power me hereunto enabling, I, WALTER F. FREAR, Governor of Hawaii, having held the hearing of which notice has been duly given as in said acts provided, do hereby RECOMMEND AND APPROVE as a Forest Reserve, to be called the "Lihue-Koloa Forest Reserve," those certain pieces of government and privately owned lands in the Districts of Puna and Kona, Island of Kauai, which may be described as lying on the Southern and Eastern slopes of the central mountain of Kauai, embracing the area above the sugar plantations that still remains in forest, and containing an area of 29,260 acres, more or less, in the Districts of Puna and Kona, Island and County of Kauai, Territory of Hawaii, more particularly described by and on a map made in November, 1908, by the Government Survey Department of the Territory of Ha-

waii, which said map is now on file in the said Survey Department, marked "Registered Map Number 2375," and a description accompanying the same numbered C. S. F. 1966, which said description now on file in said Survey Department, is as follows:

LIHUE-KOLOA FOREST RESERVE.

Including Portions of the Ahupuaas of Hanapepe, Wahiawa, Kalaheo, Lawai and Koloa, in the District of Kona, and Portions of the Ahupuaas of Haiku, Hanamaulu, Wailua, North Olohena and Waipouli, in the District of Puna, Island of Kauai.

Beginning at Forest Reserve Monument on "Puu Aukai" or "Puuau," a hill on the boundary ridge of the lands of Hanapepe and Wahiawa, and at the end of the McBryde fence, as shown on Government Survey Registered Map Number 2438, (the boundaries of the whole FOREST RESERVE being shown on Government Survey Registered Map Number 2375), and running as follows:

Across the land of Wahiawa, as shown on Government Survey Registered Map Number 2438, on the following true azimuths and distances:

1. $315^{\circ} 45'$ 3230.0 feet;
2. $294^{\circ} 11'$ 1045.0 feet to Forest Reserve Monument on the Wahiawa-Kalaheo boundary;
- Thence along and across the land of Kalaheo, as shown on Government Survey Registered Map No. 2378, on the following true azimuths and distances:
3. $10^{\circ} 18'$ 2119.6 feet along the Wahiawa-Kalaheo boundary to Forest Reserve Monument in a group of Kukui trees called Nahalemu-hulu, the true azimuth to "Papaholahola" Trig. Station being $347^{\circ} 24'$, and the true azimuth and distance to a point on the Wahiawa-Kalaheo boundary called "Kapuna" is $10^{\circ} 18'$ 1930.6 feet;
4. $260^{\circ} 08'$ 2067.6 feet along Lots 96, 95, end of road, and Lot 94 of the Kalaheo Homesteads to Forest Reserve Monument at "Ahua" Trig. Station;
5. $284^{\circ} 38'$ 763.8 feet down slope to a + on Ohia tree at the corner of forest fence;
6. Thence along forest fence, the direct azimuth and distance to "Ohia" Trig. Station, 40 feet North of said fence, being: $250^{\circ} 49'$ 1955.5 feet, said station being marked by $1\frac{1}{2}$ inch pipe;
7. Thence still along forest fence, the direct azimuth and distance to Forest Reserve Monument at "Kapohaku" Trig. Station being: $254^{\circ} 39'$ 1309.2 feet; said station being 100 feet North of forest fence at angle of Kalaheo-Lawai boundary, and the true azimuth and distance to "Wahiawa" Trig. Station is $28^{\circ} 10'$ 15713.2 feet;
8. Thence across the land of Lawai, along forest fence, as shown on Government Survey Registered Map No. 2438, the true azimuth and distance to Forest Reserve Monument at "Kaluamoa" Trig. Station on the Lawai-Koloa boundary being: $327^{\circ} 09'$ 5850.7 feet; Thence across the land of Koloa, as shown on Government Survey Registered Map No. 2404, on the following true azimuths and distances:
9. $231^{\circ} 24'$ 4475.0 feet to Forest Reserve Monument on lateral ridge;
10. $206^{\circ} 14'$ 1160.0 feet to Double Rock;
11. $266^{\circ} 31'$ 647.0 feet;
12. $241^{\circ} 03'$ 950.0 feet skirting slope;
13. $227^{\circ} 02'$ 877.0 feet skirting slope;;
14. $202^{\circ} 30'$ 673.0 feet skirting slope;
15. $162^{\circ} 20'$ 419.0 feet skirting slope;
16. $148^{\circ} 52'$ 2731.0 feet to Forest Reserve Monument;
17. $216^{\circ} 20'$ 512.0 feet;
18. $167^{\circ} 06'$ 2000.0 feet along Koloa Plantation Storm Ditch;

19. $192^{\circ} 42'$ 884.0 feet to old shaft 100 feet deep;
20. $279^{\circ} 21'$ 2210.0 feet to Forest Reserve Monument on fence line on the Koloa-Haiku boundary at edge of the McBryde Ditch of 1906; Thence across the land of Haiku, as shown on Government Survey Registered Map No. 2404, on the following true azimuth and distances;
21. Along the McBryde Ditch of 1906, the direct azimuth and distance to Forest Reserve Monument on ridge being: $231^{\circ} 29'$ 2712.0 feet;
22. Still along the McBryde Ditch of 1906, the direct azimuth and distance to Forest Reserve Monument on Uluhi Hill, just below the ditch, being: $181^{\circ} 58'$ 3260.0 feet;
23. $246^{\circ} 27'$ 2540.0 feet;
24. $249^{\circ} 36'$ 6438.0 feet to Forest Reserve Monument on line of the Kauai Electric Company's pole line;
25. $113^{\circ} 40'$ 3388.0 feet along the Kauai Electric Co. pole line to Forest Reserve Monument on the Haiku-Hanamaulu boundary; Thence along and across the lands of Hanamaulu, as shown on Government Survey Registered Map No. 2438, on the following true azimuths and distances:
26. $275^{\circ} 25'$ 2518.0 feet along the Haiku-Hanamaulu boundary to Boundary Stone on the West edge of Kilohana Crater;
27. $275^{\circ} 24'$ 2977.0 feet along the Haiku-Hanamaulu boundary across Kilohana Crater to a Stone on the East edge of said crater;
28. $163^{\circ} 53'$ 5360.0 feet across Hanamaulu to Forest Reserve Monument near lone Ohia tree;
29. $140^{\circ} 19'$ 4480.0 feet to Forest Reserve Monument at gate near edge of Waiahi Ravine;
30. $224^{\circ} 54'$ 1982.0 feet along the Kauai Electric Co. pole line;
31. $225^{\circ} 30'$ 4699.0 feet to Forest Reserve Monument on North bank of the South branch of the Wailua River near pipe crossing near ditchman's house, said house being on the Hanamaulu-Wailua boundary; Thence across the land of Wailua, as shown on Government Survey Registered Maps Nos. 2438 and 2375, on the following true azimuths and distances;
32. $201^{\circ} 22'$ 3460.0 feet along the Kauai Electric Co. pole line;
33. $167^{\circ} 12'$ 4480.0 feet along the Kauai Electric Co. pole line to Forest Reserve Monument on Southeast slope of Hanahanapuni Hill, the true azimuth and distance to "Hanahanapuni" Trig. Station being $90^{\circ} 35'$ 1417.0 feet;
34. $195^{\circ} 24'$ 12345.6 feet to Forest Reserve Monument at the end of Kamoooopulu Ridge on the Wailua-North Olohena boundary; Thence across the lands of North Olohena and Waipouli, as shown on Government Survey Registered Map No. 2452, on the following true azimuths and distances:
35. $236^{\circ} 28' 30''$ 1645.0 feet to Forest Reserve Monument at a place called "Puuopae" on the North Olohena-Waipouli boundary;
36. $165^{\circ} 41' 00''$ 3112.5 feet to Forest Reserve Monument on the Waipouli-Kapaa boundary;
37. Thence up the watershed of ridge, the Waipouli-Kapaa boundary, the direct azimuth and distance being: $100^{\circ} 21' 30''$ 4031.0 feet to Forest Reserve Monument at a place called "Kainamanu," elevation 1144 feet; from which "Honau" Trig. Station is by true azimuth and distance $301^{\circ} 13' 30''$ 22072.5 feet;
38. Thence still up the watershed of ridge, the Waipouli-Kapaa boundary, the direct azimuth and distance being $128^{\circ} 59' 30''$ 1779.5 feet to a concrete post at a place called "Kahilimalani", where this ridge joins the Kuilau ridge and being the head of the land of Waipouli, elevation 1145 feet;
39. Thence up the watershed of the Kuilau ridge, the Wailua-Kapaa boundary to $1\frac{1}{2}$ inch pipe;

40. Thence still up the watershed of the Kuilau ridge, the Wailua-Kapaa boundary, to the West end of Makaleha Mountain at a place called "Pehuaola" marked by 1½ inch pipe, from which "Nonou" Trig. Station is by true azimuth 311° 36' 30", "Pohakupili" Trig. Station is by true azimuth 258° 15' 30", and "Kainamanu" Trig. Station is by true azimuth 348° 28'; the elevation of "Pehuaola" being 3165 feet;
41. Thence in a Northerly direction along the ridge, the Wailua-Kapaa boundary, to a point on the top of the main range dividing the Puna and Halelea districts;
42. Thence in a Southwesterly direction along the Puna-Halelea district boundary, along the HALELEA FOREST RESERVE, following the divide between watersheds and down a spur to an elevation of 1880 feet, and thence up to "Keahua," the elevation of which is 1905 feet, the direct azimuth and distance from "Makaleha", a point on the Kapaa-Kealia-Kalihiwai boundary being: 69° 49' 6682.0 feet;
43. Thence in a Southwesterly direction along the Puna-Halelea district boundary, along the HALELEA FOREST RESERVE, following the ridge to an elevation of 1820 feet and up to "Hanalei" Trig. Station, marked by a stone set in the ground and being the Southeast corner of the land of Hanalei, the elevation of which is 1940 feet, and the direct azimuth and distance from end of last course being: 39° 23' 1064.0 feet;
44. Thence in a Southwesterly direction along the Puna-Halelea district boundary, along the HALELEA FOREST RESERVE, to the summit of Mt. Waialeale, the elevation of which is about 5240 feet, said Mt. Waialeale being at the junction of the boundaries of the Puna, Kona and Halelea districts;
45. Thence in a Southwesterly direction along the main range dividing the Puna and Kona districts, along the NA PALI-KONA FOREST RESERVE, to a point called Kawaikini on the boundary between the lands of Makaweli and Hanapepe, the elevation of said point being about 5250 feet;
46. Thence in a Southerly direction along the main range dividing the Puna and Kona districts, along the NA PALI-KONA FOREST RESERVE, to a point called "Kapaloa" on the boundary between the lands of Hanapepe and Wahiawa;
47. Thence in a Southwesterly direction, along the NA PALI-KONA FOREST RESERVE, down the ridge dividing the lands of Wahiawa and Koula (an ili of Hanapepe), to the point of beginning.

AREAS.

District of Kona.

Lands.	Acres.	
Hanapepe	10	
Wahiawa	2,075	
Kalaheo (Government)	1,275	
Lawai	350	
Koloa	980	4,690 Acres
	<hr/>	

District of Puna.

Haiku	2,900	
Hanamaulu	9,580	
Wailua (Government)	11,670	
North Olohena	150	
Waipouli	270	24,570
	<hr/>	
Total Area		<hr/> 29,260 Acres

And, as provided by law, subject to the existing leases, I do hereby SET APART as parts of the Lihue-Koloa Forest Reserve those portions of the government lands known as Wailua, in the District of Puna, and Kalaheo, in the District of Kona, that lie within the metes and bounds of the above described Lihue-Koloa Forest Reserve.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the Territory of Hawaii to be affixed.
Done at the Capitol in Honolulu, this 5th day of June,
A. D. 1909.

W. F. FREAR,
Governor of Hawaii.

By the Governor,
E. A. MOTT-SMITH,
Secretary.

MOLOAA FOREST RESERVE.

PROCLAMATION OF FOREST RESERVE IN THE DISTRICT OF KOOLAU, ISLAND AND COUNTY OF KAUAI.

Under and by virtue of the authority vested in me by the provisions of Chapter 28 of the Revised Laws of Hawaii, as amended by Act 65 of the Session Laws of 1905, and by Act 4 of the Session Laws of 1907, and of every other power me hereunto enabling, I, WALTER F. FREAR, Governor of Hawaii, having held the hearing of which notice has been duly given as in said acts provided, do hereby RECOMMEND AND APPROVE as a Forest Reserve, to be called the "Moloaa Forest Reserve," those certain pieces of government and privately owned land in the District of Koolau, Island of Kauai, which may be described in general terms as including the upper slopes of the North side of the Anahola ridge and the area above the agricultural land at the Northern end of the main mountain mass that occupies the center of the Island of Kauai, and containing an area of 5,670 acres, more or less, in the District of Koolau, Island and County of Kauai, Territory of Hawaii, more particularly described by and on a map made in October, 1908, by the Government Survey Department of the Territory of Hawaii, which said map is now on file in the said Survey Department, marked "Registered Map Number 2375," and a description accompanying the same, numbered C. S. F. 1961, which said description now on file in said Survey Department, is as follows:

MOLOAA FOREST RESERVE.

Including the Lands of Kilauea, Kahili, Papaa, Pilaa, Lepeuli, Papaa-Moloaa, Moloaa, Papaa and Aliomanu, District of Koolau, Island of Kauai.

Beginning at a Forest Reserve Monument in the land of Pilaa, on a hill South of the Ka Loko Reservoir, elevation 866 feet; from which Government Survey Trig. Station "Kamoku" is by true azimuth and distance $180^{\circ} 14'$ 4417.1 feet and Government Survey Trig. Station "Kilauea" is by true azimuth $162^{\circ} 13'$, as shown on Government Survey Registered Map No. 2373, and running by true azimuths:

1. $268^{\circ} 34'$ 4808.9 feet crossing Pilaa, the South portion of Grant 757 to Castro, the Moloaa Stream and the Government portion of Moloaa to a pipe at end of small ridge North of the old Swift Mountain House; elevation 620 feet;
2. $255^{\circ} 33'$ 3348.7 feet across Government portion of Moloaa to $1\frac{1}{2}$ inch pipe in a pile of rocks about 100 feet North of Kalaina's grave, elevation 593 feet;

3. 301° 16' 30" 1034.6 feet across Government portion of Moloaa to 1½ inch galvanized pipe on ridge at "Puuelemanu" just West of Keapaweo Stream, elevation 643 feet;
4. 282° 15' 4647.3 feet crossing the Keapaweo Stream, the Lindsay Lot and Grant 549 to E. Rouxel to + on stone, and ahu at Kaohe near base of cliff and North of the Kaluaaliea Gulch and in the Government portion of Papaa, elevation 419 feet;
5. 311° 16' 1386.6 feet across Government portion of Papaa to 1½ inch galvanized pipe at "Kikimau," being about 5 feet South of a large rock, elevation 394 feet;
6. 312° 51' 3741.0 feet across Papaa (Moloaa Hui Lands) into land of Aliomanu (Moloaa Hui Lands) to an 1½ inch galvanized iron pipe at "Kakii," elevation 320 feet;
7. 326° 00' 30" 1203.6 feet across Aliomanu (Moloaa Hui Lands) to 1½ inch pipe about 1350 feet East of Apolo's house on same ridge, elevation 300 feet;
8. 339° 03' 3267.7 feet across Aliomanu (Moloaa Hui Lands) to 1½ inch pipe at "Nakii," elevation 320 feet;
elevation 276 feet; from this point "North Base" Trig. Station is by true azimuth and distance 249° 09' 5492.1 feet, and "Waiawa-awa" Trig. Station is 191° 33' 8703.4 feet;
Thence running along the land of Anahola by the following true azimuths and distances:
9. 73° 18' 3049.0 feet to summit of "Kikoo" marked by a pipe and large ahu, elevation 1477 feet; from this point the description of the land of Anahola by James Gay is used;
10. 112° 00' 2772.0 feet to Keaweamakua;
11. 110° 00' 4158.0 feet to "Puu Eu," elevation 1942 feet;
12. 101° 00' 1452.0 feet along ridge;
13. 100° 20' 2442.0 feet along ridge to Puukeakea;
14. 152° 30' 891.0 feet along ridge;
15. 171° 00' 1386.0 feet along ridge to bend in same;
16. 56° 15' 4356.0 feet along ridge to Kaeaoopuu, where old road crosses range;
17. 76° 00' 1254.0 feet along ridge;
18. 65° 15' 6832.0 feet along ridge to top of Malamalama-iki Peak;
19. 93° 00' 5214.0 feet to a peak;
20. 69° 00' 726.0 feet to a peak;
21. 89° 02' 3412.0 feet to a peak called Hamahana on the boundary of Anahola and Kilauea, being also the boundary of the Koolau and Halelea Districts;
22. 184° 25' 12410.0 feet, more or less, along the Halelea District boundary to a point where the proposed new makai line of the HALELEA FOREST RESERVE intersects said boundary.
23. 272° 50' 1135.0 feet to a Forest Reserve Monument on Kamookoa Ridge in the land of Kilauea;
24. 284° 15' 30" 12836.6 feet crossing the lands of Kilauea, Kahili, Papaa and Pilaa to the point of beginning.

AREAS.

Kilauea	1390	acres more or less		
Kahili	475	"	"	"
Papaa (Government land)	1425	"	"	"
Papaa (Grant 528)	5	"	"	"
Pilaa	40	"	"	"
Lepeuli (Grant 757)	1	"	"	"
Papaa-Moloaa (Government land)	2190	"	"	"
Moloaa (Hui lands)	13	"	"	"
Papaa (Hui lands)	6	"	"	"
Aliomanu (Hui lands)	125	"	"	"
Total area	5670	"	"	"

And, as provided by law, subject to the existing leases, I do hereby SET APART as parts of the Moloaa Forest Reserve, those portions of the government lands known as Papaa and Papaa-Moloaa, in the District of Koolau, that lie within the metes and bounds of the above described Moloaa Forest Reserve.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the Territory of Hawaii to be affixed.
Done at the Capitol in Honolulu, this 5th day of June,
A. D. 1909.

W. F. FREAR,
Governor of Hawaii.

By the Governor,
E. A. MOTT-SMITH,
Secretary.

BY AUTHORITY.

CONCURRENT RESOLUTION.

SESSION OF 1909.

BE IT RESOLVED BY THE HOUSE OF REPRESENTATIVES OF THE TERRITORY OF HAWAII, THE SENATE CONCURRING:

That it is declared to be the opinion of this Legislature that expenditures by the Board of Agriculture and Forestry during the biennial period ending June 30, 1911, should be made, as nearly as may be, according to the following schedules:

General.

Clerks, Stenographers, Employees, Laborers and other expenses. . \$36,960.00
Aid to Hawaii Experiment Station..... 10,000.00

Division of Forestry.

Superintendent (\$250.00)..... 6,000.00
Assistants, Laborers, etc..... 9,000.00

Division of Entomology.

Superintendent (\$250.00) 6,000.00
Assistants, Inspectors, Employees 9,000.00

Division of Animal Industry.

Superintendent (\$250.00) 6,000.00
Assistants, Employees 5,040.00

Hydrographic Survey.

Hydrographic Survey 20,000.00
(To be expended under the direction of the Superintendent of Public Works.)

\$108,000.00

AND BE IT FURTHER RESOLVED, that it is the opinion of this Legislature that the Board of Agriculture and Forestry should, during the next biennial period, use every effort possible to accomplish the re-forestation of those portions of the Territory where the former forests have died or been destroyed, more especially in the Kohala mountains on the island of Hawaii where large irrigation ditches are conveying the waters derived from the water shed into the Districts of Kohala and Hamakua;

W. D. S!
President

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THE HAWAIIAN FORESTER AGRICULTURIST

Vol. VI

JULY, 1909

No. 7

It is not improbable that the department of agricultural science which will most benefit the human race in future years is that of plant breeding. Hitherto but little has been achieved by the scientific plant breeder, that is, little in comparison with the boundless store of varieties of plants suited to fulfil peculiar economic conditions which, it is predicted, will be evolved by the operation of principles which are now becoming to be understood and successfully applied. It is true that our cultivated varieties of fruits, flowers and grains have been produced from elementary ancestors of little resemblance to their luxuriant descendants, but the process of evolution has been achieved only after great duration of time and often under methods whose true scientific principles were little understood. At first primitive man gathered from their native habitat the few uninviting roots and seeds with which he appeased his hunger. The first step towards improvement of such food plants took place when in order to save the labor of gathering, he planted them near his home and aided their development by working the soil and discovered the beneficial use of fertilizer. Then commenced a long and slow period of advancement. By selection of the more promising plants as parents for the new crop, the hard woody qualities of the primitive ancestors of our vegetables developed into the soft and succulent varieties of our garden crops. The hard and acid berries of the vine and tree mellowed into the generous and luscious grape, apple and peach.

All this, however, necessitated many centuries of laborious work and many of the advances taken were no doubt unconscious. At length in China and ancient Rome the breeding of plants came to be looked upon as a regular profession, and to these countries and to the members of the monastic houses of the middle ages are to be attributed many of the most direct advances in plant production. It is only now, however, that the principles lying at the basis of the improvement of plant stocks are beginning to be applied and that scientific agriculturists are consciously breeding plants for specific purposes. Given time, and that a not too distant date, the modern plant

breeder will produce types of plants to resist particular fungus and insect pests; he will evolve varieties of economic plants to flourish in climatic conditions now considered impossible for their existence; he will multiply their production three-fold; and finally by combination he will produce new breeds of plants of entirely new type.

It is to be considered that hitherto the development of our present economic plants has been confined almost exclusively to the flora of temperate zones. When the principles of scientific breeding have been applied for some generations to our luxuriant tropical species, the great future for this new department of science can be partly appreciated. For this purpose Honolulu is particularly well situated and is fortunate in the presence here of scientists who are not only versed in the new methods of development, but have already made headway in their operation. Among the work already in progress may be mentioned the production of a new rice and a new cotton specially adapted to our peculiar needs, and the development of a variety of the papaia possessing a sufficiently toughened skin to withstand the long transit to the mainland market.

On another page of this issue of the Forester appears a table showing the areas of the existing forest reserves, corrected to June 30, 1909. With the four new reserves proclaimed in June, the total area is brought up to 545,764 acres, of which 65 per cent. is government land.

FARMERS' INSTITUTE WORKERS.

Among the important conferences of importance to agriculture which take place this summer on the mainland, should be included the annual meeting of the American Association of Farmers' Institute Workers, which will be held at Portland, Oregon, on August 16th and 17th next. Among some of the most interesting subjects of discussion, the practicability will be considered of conducting demonstrations in stock feeding and management, and in field, orchard and vineyard production, and the advisability of employing experts to devote their whole time to visiting farmers and offering advice respecting the improvement of their practice. Another plan which it is hoped to arouse sufficient interest in to put it in operation, is the establishment of a movable school of agriculture to be maintained in the field the entire year. Much definite advantage is to be expected from such representative agricultural meetings as the one about to take place and the account of the proceedings will be awaited with great interest.

WOMAN'S RIVERS AND HARBORS CONGRESS.

MEETING OF THE HONOLULU BRANCH.

On Wednesday afternoon, June the sixteenth, at the Hotel Pleasanton, the Honolulu Branch of the Woman's National Rivers and Harbors Congress held its second regular quarterly meeting. In the absence of the Vice-President, Mrs. Augustus Knudsen, Mrs. Harmon Hendrick, Chairman of the Education Committee, presided. The purpose of the meeting was to review the history of the movement for conservation and to put in a true perspective the work of the local association.

The speakers of the afternoon were Mrs. Gerritt Wilder, who outlined the steps already taken; Mrs. Stanford Moses, who briefly summarized the addresses given at the Conference of Governors called by President Roosevelt a year ago and emphasized the need of concerted and immediate action in conserving our diminishing resources; and Mrs. J. M. Dowsett, who spoke of Hawaii's special resources and special needs.

After a brief discussion of the papers Mrs. W. W. Hall reported the proposal of the Aloha Chapter of the Daughters of the American Revolution to stimulate interest in the movement among the students of Oahu College and the McKinley High School by offering a prize for the best essay on Conservation. Mrs. Hendrick told of Mrs. Augustus Knudsen's cordial reception by the Federation of Woman's Clubs in California and the opportunity given her to be present at the General Convention at Del Monte.

Reports were given from the Hilo Branch of the Congress. It was stated that actual reforestation is being done by the associations in Kau and Hamakua districts, the women caring for thousands of young trees in their own gardens until they are ready to be planted. Mrs. George Cocke also sent names of some new members on Molokai.

THE AVOCADO PEAR IN CALIFORNIA.

"Alligator Pears" have been grown for a number of years in California, the market price for which in Los Angeles has been from \$2.00 to \$3.00 per dozen. It is stated that the average annual yield from several trees around that city is about \$65.00. It is safe to say that the best varieties of Hawaiian fruit is greatly superior to any grown in California, but there seems to be little effort on the part of our growers to supply the mainland market. No doubt the success of the Hawaiian pineapple has attracted planters to confine their attention to the merits of that fruit rather than venture upon the production of one whose carrying qualities are more problematical and the demand for whose merits has yet largely to be created.

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

REPORT OF THE DIVISION OF FORESTRY FOR JUNE, 1909.

Honolulu, Hawaii, July 7, 1909.

Board of Commissioners of
Agriculture and Forestry,

Honolulu.

Gentlemen: I have the honor to submit herewith the report of the Division of Forestry for June, 1909:

NEW FOREST RESERVES.

On June 5th Governor Frear signed proclamations creating the four forest reserves of which mention was made in my report for May; the Mauna Kea Forest Reserve on Hawaii, the Waihou Spring Forest Reserve on Maui, and the Lihue-Koloa and Moloaa Forest Reserves on Kauai, altogether an area of 101,614 acres, of which 82 per cent. is government land. There are now 20 forest reserves in Hawaii, with an aggregate total area of 545,764 acres, of which 65 per cent., or 357,180 acres, belongs to the Territory. The several reports of the Superintendent of Forestry in regard to these recent forest reserve projects and the proclamations in regard thereto are published in the Hawaiian Forester and Agriculturist for June.

During the month progress has been made in the matter of the setting apart of additional forest lands in the Kohala District on Hawaii. A map has recently been completed by Mr. S. M. Kanakanui of the Survey Office showing the boundaries of the section proposed to be reserved and the areas of individual lands therein. This map will be of particular use in helping to affect a satisfactory settlement with the owners of private land within the proposed reserve.

Hon. H. L. Holstein, Speaker of the House of Representatives, is at present working on a plan of coöperation between the plantations and the ranch owners in Kohala through which it is hoped the desired reservation may be affected. Within a comparatively short time I hope to be able to report that definite results have been accomplished.

PROPOSED LUMBERING IN PUNA.

During the early part of the month I devoted considerable time to conferences with the Committee on Forestry and with the Governor in regard to the proposition to lumber the tract of government land in the District of Puna, Island of Hawaii, situated mauka of the Kaohe homesteads above Pahoā. A report with recommendations on this matter was submitted to the Board under the date of June 1st and acted on at a meeting of the Board held on June 23.

From June 18-26 I was away from Honolulu on a trip to the Island of Maui with the object of inspecting forest lands on Mt. Haleakala and of arranging for tree planting on West Maui. In company with Mr. Louis von Tempsky, manager of the Haleakala Ranch, I visited and made a thorough examination of the open grass land above the forest on the windward slopes of the outside of the crater of Mt. Haleakala, or the privately owned lands of Haiku and Kalialinui. There is some question of opening this area as a paddock of the Haleakala Ranch, for which purpose it is admirably adapted. But owing to the steep slope and the rapid erosion that would be likely to take place were the area overstocked, the question of holding this section as a forest reserve, to be eventually got under a forest cover, is one that should be seriously considered. My object in visiting this tract at this time was to be familiar with the facts of the case should any proposal be made looking to the acquirement of the area by the Government.

During my stay on Maui I made a careful inspection of the excellent work in tree planting now being done by the Wailuku Sugar Company under the direction of its new manager, Mr. H. B. Penhallow. I also made provisional arrangements with Mr. Louis Weinzheimer, the new manager of the Pioneer Plantation, in regard to tree planting about to be undertaken by that company.

WORK AT THE GOVERNMENT NURSERY.

Mr. Haughs reports that during the past six months (January 1 to June 30, 1909) trees have been distributed from the Government Nursery, as follows:

Free Distribution, Forest Trees.

Potted	2,500
In transplant boxes	1,560
In seed boxes	3,000

Ornamental.

Potted	150	
	<hr/>	
Total		7,210

Forest Trees, Sold.

Potted	3,722
In transplant boxes	6,250
In seed boxes	39,000

Ornamental.

Potted	280	
	<hr/>	
Total		49,252
		<hr/>
Grand total		56,462

Arrangements are being actively made whereby a large number of forest trees will be available for free distribution for Arbor Day planting in November, 1909, from the Government Nursery in Honolulu and especially from a number of sub-nurseries and distributing points that are being established in different parts of the Territory. A more definite statement in regard to this matter will be made next month but plans are already well in hand for this work.

During the month labels giving the botanical and common name and the original locality have been attached to all the trees in the Government Nursery, making the garden of greater interest to visitors and other persons desiring to know about the local flora.

EXPERIMENTAL GARDEN MAKIKI AND TANTALUS FOREST.

During the month satisfactory progress has been made in getting the experimental garden at Makiki into shape for planting. Much remains to be done but several of the plots are now practically ready for the final planting.

For one day in each week all the available men employed by the Division of Forestry have been put to work beating down and cutting the dead lantana along the main road and the trails through the Tantalus forest. In this way the fire danger has been materially reduced. Arrangements are now in hand for removing the dead wood from this forest, an operation which will at once increase its usefulness and add to its beauty.

BOTANICAL COLLECTION.

During the month of June Mr. J. F. Rock, the Botanical Assistant of the Division, has been on Hawaii, at Huehue, Puuwaawaa and the Parker Ranch, collecting specimens of native trees and shrubs, seeds of indigenous plants and weeds on the open range on the cattle ranches. Mr. Rock has been able to secure a very considerable number of specimens, so that his trip is decidedly one of accomplishment.

FOREST VIEWS FOR SEATTLE.

As a part of the exhibit of the Division of Forestry for the Alaska-Yukon-Pacific Exposition at Seattle, Mr. Bonine made under my direction 8 large transparencies, 18x22 inches, of scenes illustrating forest work in Hawaii; four showing the native forest in its relation to stream protection, the other four, views of forest plantations. These transparencies properly labelled were on exhibition for a few days in the rooms of the Promotion Committee before being sent to Seattle with Mr. Bonine's other transparencies. They attracted much favorable comment as I believe they will at Seattle. The department is fortunate in securing the services of a man of Mr. Bonine's ability in getting this exhibit prepared.

In connection with the forest exhibit I have prepared a short statement on Forestry in Hawaii, which has been printed by the Promotion Committee as an eight-page leaflet, for distribution at Seattle.

WILD BIRD LAW.

In connection with the passage by the recent Legislature of an act amending the Wild Bird Law, of which this Board was the execution, whereby a four years' tabu was placed on the Hawaiian Goose (Nene), a circular letter was sent out on June 29 to the District Foresters, who are commissioned as Territorial police officers, calling their attention to the change in the law and requesting their coöperation in its enforcement.

EXTENSION OF THE LIBRARY.

In the latter part of the month additional book cases were built into the Library room of the Board to accommodate the growing collection of books and pamphlets that is constantly being received by the Library. The work was done by Lucas Brothers. The additional space will be of material assistance in making the library available for use.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ANIMAL INDUSTRY.

REPORT OF THE TERRITORIAL VETERINARIAN
FOR JUNE, 1909.

Honolulu, June 23, 1909.

Mr. President and Members of the Board:

I beg to report on the work of this Division since the last meeting of this Board on June 2d as follows:

GLANDERS.

Through the efforts of Mr. Venhuizen a number of cases of glanders and a large number of suspicious cases have been located and, as a rule, removed to the quarantine station in Kalihi, where they have been held for observation, testing and, if necessary, destruction. Two animals have been destroyed, both belonging to a local horse dealer, and a number have been tested, and with one exception, returned to their respective owners. One animal is, at the present time, continued in quarantine for observation.

The great difficulty to decide offhand whether an animal has glanders or not has been very strongly impressed on me of late, there having been a great number of cases of the so-called Hawaiian nose disease which frequently assume forms and exhibit symptoms which it is practically impossible to distinguish from glanders even for the experienced eye. Mr. Venhuizen in his continued inspection of stables, hack-stands and animals on the street has naturally come across a number of these cases, which has necessitated considerable work on the part of myself and my assistant in responding to Mr. Venhuizen's calls for assistance. There is, however, no other way in which this inspection service can be carried out, and I would, therefore, recommend that Mr. Venhuizen be continued in this work until further notice.

HOG CHOLERA.

On June 4th the S. S. "Virginian" arrived here with a consignment of 126 hogs, which had been shipped from San Francisco on May 25th and were consigned to the Hawaiian Meat Company. The captain of the vessel informed me that some of the hogs had died on the way and upon investigation found that eleven animals had died and that a large number of them were sick, exhibiting the characteristic symptoms of hog cholera.

As it was late in the day I ordered the animals to remain

a board until arrangements could be made for their safe removal to quarantine. The next morning I found the actual owner of the hogs, a Chinaman by the name of Yee Yap, and arranged with him to have the hogs taken to the quarantine station in Kalihi. The animals were unloaded in two railroad cars and were taken by an engine to the place where the track crosses the Kalihi quarantine station road. Here they were met by ten drays which carried them to the quarantine station. The further history of this case can be resolved into a statement to the effect that even though the apparently well animals were segregated from the decidedly affected ones they continued to die at a rate of from three to ten per day. It was finally decided to allow the Chinaman to butcher those which, after fourteen days of arrival, had shown no symptoms of the disease, subject to a careful inspection by the Meat Inspector of the Territorial Board of Health. This was done with the result that thirty-five animals were saved out of the total of 26. I would further state that this shipment was accompanied by the usual certificate of inspection issued by the Federal Inspector in San Francisco, but I have learned that, while the animals came from a district in California where hog cholera has not been known to exist for a long period, they were unloaded and held for several days in Oakland, waiting shipment, and undoubtedly received their infection there. The fact that the animals developed the disease so rapidly and that many died without having been sick for more than a few days fully demonstrates that the shipment came from a place where cholera must have been unknown.

I have reported the matter to the Federal Inspector in San Francisco and asked him to ascertain, if possible, where the animals received their infection and further to suggest such measures as in his opinion would prevent a recurrence of this incident.

QUARANTINE STATIONS.

At the last meeting of this Board I requested permission to spend one hundred dollars for the purpose of placing the quarantine station in Kalihi in temporary repair, as it did at the time appear that several months might elapse before a new quarantine station could be arranged for and built. With the permission of the Committee on Animal Industry this work commenced on June 4th, that is the day before the sick hogs had to be brought to the station. The fact that carpenters were on the ground and material there, enabled me to make a couple of pens hog-proof and get them into shape for the arrival of the sick animals. Except for this coincidence I could not have had a place where the animals could have been taken to. On June 9th the President of this Board visited the quarantine station in company with me and decided to ex-

tend the repairs to all of the pens, the sum to be expended not to exceed the five hundred dollars which were set aside for this purpose at a meeting of the Board on February 4th of this year.

IMPORTATION OF LIVE STOCK.

Since the last meeting of the Board the following steamers carrying live stock have arrived:

June 5th, S. S. "Virginian"—115 head of hogs.

June 9th, S. S. "Hilonian"—19 mules, 1 horse, 2 dogs, crates of poultry.

June 11th, S. S. "Alameda"—4 crates of ducks, 2 dogs, crates of chickens.

June 20th, S. S. "Mexican"—25 mules, 9 horses, 20 cattle (cow, no certificate), 10 hogs (no certificate), 4 crates of poultry, 6 sheep (no certificate).

June 22d, S. S. "Lurline"—10 mules (Kahului), 1 mule (Hilo), 1 crate of chickens, 2 crates of pheasants.

The 17 mules and 1 horse on the Hilonian were placed in quarantine, from which they were released yesterday after inspection. The S. S. "Mexican" arrived from Seattle and the stock on board her was, therefore, not subject to quarantine.

In connection with this shipment, however, I have to report that all of the stock on board was consigned to the owner, Mr. James McQueen, who has been an importer of live stock for years and who has at least once before violated the regulations of this Board by bringing in untested and uninspected stock. In the present case the shipment contained one cow, ten hogs and six sheep for which Mr. McQueen had no certificate of inspection, testing and dipping. This violation of the rules cannot possibly be considered due to ignorance of the same, as they were fully explained to him the last time he violated them and constitutes, in my opinion, a willful and inexcusable disregard of the laws of the Territory, and I would ask for instructions from the Board as to what action to take in the matter.

The ten mules which arrived on the S. S. "Lurline" on the 22d instant were, contrary to the wireless report received a few days ago, consigned to Kahului and not to Hilo. The mules were intended for the Wailuku Plantation Company and, as there is no official quarantine station on Maui, a wireless message was immediately sent to the manager of the Wailuku Plantation Company as well as to the Deputy Territorial Veterinarian for Maui inquiring whether satisfactory quarantine premises could be provided at Kahului, as otherwise it would be necessary to unload the mules here for quarantine instead of allowing them to continue the voyage on board the "Lurline."

As assurances were received from the Deputy Territorial Veterinarian that such satisfactory premises could be provided, the animals were allowed to remain on board and will leave this evening for Kahului. The animals were all accompanied by the requisite certificates of inspection and testing.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

SHIPPING OF 1908.

During 1908 the shipping entering the port of Honolulu aggregated 920,000 tons of a gross value of \$63,562,840. The shipping between Honolulu and mainland and foreign ports amounted to 600,000 tons of a value of \$41,562,840. Between Honolulu and other island ports the amount reached 320,000 tons of a valuation of \$22,000,000.

PINEAPPLE OUTLOOK.

Many factors are at work which makes the future of the Hawaiian pineapple and canning industry one of great promise. The active advertising campaign has contributed largely to the growing demand for our pines and in direct response to this, not only has the reserve stock of our local warehouses been disposed of, but orders are booked ahead for future delivery. Coupled with this a general falling off of the fruit crop on the mainland is reported, which necessarily affords an opportunity for other available supplies of like products. Another great stimulus to the industry has been afforded by the Seattle fair, where the sales of fruit alone have already justified the expense of the pineapple growers at the exposition. It is needless to say that the reputation of the Hawaiian pine will be carried by the Seattle visitors into thousands of homes throughout the mainland. In this way it is not improbable that enquiry will be made for our canned fruit from entirely new localities so that the resources of our plantations and canneries will be taxed to cope with the demand.

POSSIBILITIES OF FIG CULTIVATION.

The recently reported progress towards the establishment in Hawaii of the insect necessary to the fructification of the Smyrna fig, raises the hope that this fruit may ere long be grown as an orchard crop throughout the islands. The facility with which the Smyrna fig can be propagated, its simple cultivation and abundant yield and the facility of preparation of its fruit for market alike recommend its growth on a large scale in Hawaii. Although it is true that immense tracts of land in California, Australia and other parts of the world are suitable for this same crop, it is safe to assume that Hawaii will do for the fig what she has already done for the pineapple and the orange, and will produce a grade of fruit a little superior to the best that can be marketed from other countries. If the islands can do this there is no fear of adverse competition, as there is always a ready sale for the choicest varieties of any food commodity.

The bulk of the fig crop of the world is produced in Asia Minor, which country exports twenty-five thousand tons. In spite of the duty the United States imports the larger part of this output, although there is little doubt that in a few years the orchards of California alone will be able to supply the domestic market. Until recently the growth of Smyrna figs has been impossible in America on account of the fact that the production of the fruit is dependent upon a minute insect, which unfortunately was unknown there. The operation of this insect in the development of the fig may be briefly described as follows:

The flowers of the commercial or Smyrna fig are female only, and in order to fertilize them and make the development of fruit possible, it is necessary to pollenize them from the male flowers of the Capri or wild fig. The process of fertilization—known as caprification—is brought about artificially by means of a small "wasp" known as *blastophaga*, which deposits its eggs within the unopened capri blossoms. The inflorescence of the capri fig is hollow and is lined with "gall" flowers, which are bordered by a ring of male blossoms encircling the "eye" of the fig. The eggs of the fig-wasp are deposited within the gall blossoms and after incubation the female insect crawls through the ring of male blossoms surrounding the orifice of the fig and thus becomes covered with pollen. She now enters another capri fig and depositing her eggs produces another generation of insects. The fig growers of Asia Minor, although they appear to know little of the life history of the wasp, or indeed to be ignorant of its presence, are accustomed to hang capri figs among the Smyrna trees at

the proper season of the year. When the transfer of the capri fig to the commercial variety of tree has taken place, the female wasp forces its way within the small orifice of the Smyrna fig and loses her wings in the operation. The female flowers inside are unsuited to the deposit of her eggs and in her endeavor to achieve this, she pollenizes the Smyrna fig and makes its development possible. Having failed in her effort to lay her eggs, the wasp now leaves the fruit and deprived of wings falls to the ground and dies. All Smyrna figs thus entered expand and ripen and after becoming partially dried on the tree are allowed to fall to the ground. They are then gathered, and after being dipped in boiling brine are placed upon trays and dried—two or three days being occupied in the process. The figs are now placed in sweat boxes for about two weeks, washed in cold brine and then graded and packed.

It is possible that the caprification necessary to the development of the Smyrna fig will militate against the introduction of its cultivation in many countries on account of the belief that the work attendant upon the process is complicated and difficult. This, however, is not the case for it has been carried on for ages, as has been said, in Asia Minor, by people who probably do not understand its principles. Growers in the San Joaquin Valley in California have experienced no difficulty in its accomplishment and there should be none attendant upon its adoption here.

THE 1910 FLORAL PARADE.

Already preparations are being made for the Honolulu Floral Parade, which will take place next February, and indications are not wanting that the 1910 event will be a noteworthy advance on its successful predecessors. Centers of distribution for advertising literature have been established not only on the mainland but in Canada, Mexico, Europe and even South Africa, and the event will be heralded by postcards, letter-seals and posters wherever the mails penetrate. Amid all this attention to the detail of advertising, the Hawaiian Forester would respectfully enter a plea for the recognition in the Parade of the merits of real flowers above artificial ones. By the establishment of special prizes for decorations in real flowers a stimulus would be given to the development of a beautiful local industry.

With proper application and care these islands should become a veritable garden of flowers, so that the visitors whom our posters induced to sojourn in our midst might witness a *Floral Parade* indeed.

A NEW RUBBER INDUSTRY.

The extraordinary demand for rubber, induced alike by the many new uses to which this product is put and by the gradual shrinkage of the world's supply of uncultivated rubber producing trees has caused a close scrutiny to be made of other available sources of supply. The manufacture of artificial rubber is about as far off as the production of synthetic camphor or sugar and therefore little help is to be looked for in this direction. However, there have been found to be other rubber trees than the recognized commercial and cultivated varieties and of these two or three promise to be of great value.

As is well known the rubber of commerce is the dried milky juice or latex of various trees and plants. This fluid is present to a greater or less extent in many varieties of trees, plants and creepers. It is, however, only a few varieties which yield it in sufficient quantity and of a certain quality which are of any great account as producers of commercial rubber.

Of an entirely different kind is the rubber produced from a Mexican plant known as the guayule bush (*Parthenium argente-tatum*). This plant occurs wild in great profusion and attains the height of about three or four feet in the desert plains of Mexico and Southern Texas. The Indians had long obtained a gum or rubber from this plant by means of chewing the bark and this custom no doubt suggested the commercial value of the tree.

As has been inferred the guayule possesses no latex. The rubber is distributed in minute granules throughout the system of the plant, the bark containing the largest deposits. In order to obtain these granules and separate them from the woody tissue various processes are resorted to, the operations of which are surrounded with great secrecy. Speaking generally extraction is conducted by grinding and subsequent maceration in a solvent of the rubber.

To obtain the product the whole of the plant is destroyed. During the last five years a very large quantity of guayule rubber has been produced. Several large firms are now in operation and as a consequence the available land covered with wild shrubs is being rapidly encroached upon. However, there is yet sufficient to meet demands for many years. In 1905 the value of this variety of rubber shipped from one port alone amounted to upwards of \$125,000. Three years later there was shipped from the same port guayule rubber valued at eighteen times as much.

At present there seems no great prospect of the guayule rubber industry becoming a permanent competitor with latex rubber as every year finds the wild supply diminished and experiments at cultivation have been discouraging. The germination of the seed is very unsatisfactory, by far the greatest proportion failing to come up. The process of cultivation also greatly impairs the quantity of rubber. With the wild bushes several years are re-

ired to attain maturity, and a rubber yield of about ten per cent. of the dried plant is obtained. In plants grown under the care of cultivation the yield of rubber has been practically negligible. All means taken to hasten maturity appear to strike directly at the commercial value of the plant. The second growth from the roots is also not so valuable as the first and takes many years to be of any use. Indications therefore suggest that this new industry after enjoying a few years of great prosperity will gradually dwindle and finally entirely pass away. It must not be overlooked, however, that it is exceedingly improbable that a profitable enterprise will be allowed to disappear without an effort to permanently establish it. There is no doubt that those at present engaged in the production of guayule rubber will exhaust every scientific resource before they relinquish their hope of the future of the industry. In the face of our present knowledge of agriculture and the various sciences which contribute to successful field operations, it would be a bold assertion to say that guayule rubber is to disappear from the market. In spite of apparently insuperable obstacles to the successful cultivation of this plant, it is probable that before the wild source is exhausted many of the difficulties to the cultivation of guayule will have been in a measure solved. However, the growth of the latex producing tree will without doubt still control the market, and when the intractable guayule has been reduced to cultivation it may offer a means of turning to use some of the arid regions of these islands.

HAWAIIAN RUBBER.

Mr. E. V. Wilcox, Director of the Hawaii Agricultural Experiment Station, has received the following report upon samples of rubber sent to Seigmund, Robinow & Sohn of Hamburg, Germany. These samples were the product of the experimental tapplings at Nahiku. The valuation placed upon the better grades is equal to the price now being paid for the best plantation Para from Ceylon.

A report was also received in a late mail by William Williamson, President of the Hawaiian-American Rubber Co., from Poel Arnold, rubber importers of New York, upon samples of grades No. 1 and No. 2; in which identical valuations were placed upon the respective grades.

Dear Sir:—We are in receipt of your favor of 24th May and of the samples of rubber you have been good enough to send us. We have minutely examined these samples and beg to give you the following report:

No. 1.—Fine, pale, yellow biscuits, which would bring a better price, if coagulated more carefully, in any case the dark spots in the center should be avoided. Valuation, \$1.24½.

No. 2.—Same biscuits, a little lighter in color and less spotted. Valuation, \$1.31.

No. 3.—Mixed scrap and prime rubber in small pieces, heated and less nervous than No. 1 and 2. Valuation, \$1.00½.

No. 4 and 5.—Are heated and have suffered from being one year old. M. G. products should be sold promptly and not allowed to get old. The resin contained in the rubber has a decaying influence.

No. 4.—Laces and biscuits of dark brown color, soft and badly heated; the quality must have been very good formerly. Valuation, \$0.96.

No. 5.—Irregular pieces, outside dirty and partly badly heated a little barky. Valuation, \$0.89½ to \$0.91.

No. 6.—Scrap rubber, yellow, partly darker, little barky. Valuation, \$0.79 to \$0.81.

Manufacturers would prefer qualities No. 1 and No. 2.

All these grades of rubber are of ready sale on our market, and we should be very glad if you would be kind enough to recommend our firm to exporters on your Islands.

Always with pleasure at your disposal, we remain, dear sir,

Yours truly,

(Signed) SEIGMUND, ROBINOW & SOHN,
Hamburg, Germany.

ENEMIES OF THE HAWAIIAN FOREST.

Many causes have been proclaimed as being responsible for the destruction of our island forests. The disappearance of the native birds before their more pugnacious introduced rivals, has, it has asserted, left the indigenous boring insect without their natural enemies. The presence of cattle and goats has destroyed the mature plants and trampled the seedling out of existence. These and many other harmful agencies, all of them without doubt contributive causes to the havoc wrought, have at various times been accused as the chief agents. Be this as it may, it seems to be recognized that the chief way to safeguard the Hawaiian forest is to preserve the ground herbage whatever that may consist of. Any means of protecting the growth of grass, fern, creeper or any plant life which conserves the moisture, protects the root systems of the trees or affords cover for the tender seedling, is directly working for the benefit of the Hawaiian forest. At the same time any factor tending to destroy these growths may be regarded as inimical.

The salvation of the Hawaiian forest will, in addition to direct replanting, be found in the elimination of causes unfavorable to the ground cover and the adoption of methods suitable to its recovery.

FOREST RESERVES, TERRITORY OF HAWAII

Arranged in Chronological Order.

(Corrected to June 30, 1909.)

No.	Name.	District.	Island.	Total Area		Area Gov- ernment Land.	Area Private Land.	Date of Proclamation.		Proclamation Signed by.
				Recom- mended to be Reserved.	Acres.			Nov.	Dec.	
1	Kaipapau.	Koolauloa.	Oahu	913	913			Nov. 10,	1904	G. R. Carter
2	Hamakua Pali.	Hamakua	Hawaii	18,940	16,333		2,607	Dec. 23,	1904	"
3	Hilo	Hilo	Hawaii	110,000	60,223		49,777	July 24,	1905	A. L. C. Atkinson
4	Koolau, Maui	Koolau and Hamakualoa	Maui	42,969	30,230		12,739	Aug. 24,	1905	"
5	Halelea	Halelea	Kauai	37,500	10,990		26,510	Aug. 24,	1905	"
6	Kealia	Puna	Kauai	9,935	7,385		2,550	Mar. 9,	1906	"
7	Ewa	Ewa, Waianae and Waialua	Oahu	28,550	5,151		23,399	Mar. 9,	1906	"
8	Honouaia	Kona	Hawaii	665	665			April 4,	1906	"
9	Kau	Kau	Hawaii	65,850	59,618		6,232	Aug. 2,	1906	G. R. Carter
10	Waianaekai	Waianae	Oahu	3,257	3,150		107	Sept. 7,	1906	"
11	Lualualei	Waianae	Oahu	3,743	3,743			Nov. 30,	1906	"
12	Hana	Hana	Maui	14,825	13,767		1,058	Nov. 30,	1906	"
13	Na Pali-Kona	Na Pali and Kona	Kauai	60,540	40,650		19,890	June 12,	1907	A. L. C. Atkinson
14	West Maui	Lahaina, Kaanapali and Wai- luku	Maui	44,440	19,105		25,335	April 21,	1908	W. F. Frear
15	Makawao	Hamakuaapoko	Maui	1,830	1,830			April 21,	1908	"
16	Waiaha Spring	Kona	Hawaii	193	193			April 21,	1908	"
17	Mauua Kea	Hamakua	Hawaii	66,600	66,600			June 5,	1909	"
18	Waihou Spring	Hamakuaapoko	Maui	84	74		10	June 5,	1909	"
19	Lihue-Koloa	Puna and Kona	Kauai	29,260	12,945		16,315	June 5,	1909	"
20	Molooa	Koolau	Kauai	5,670	3,615		2,055	June 5,	1909	"
Total to June 30, 1909.				545,764	357,180		188,584			

The widespread interest now being taken in irrigation projects, conservation methods and kindred subjects has brought about a general discussion of all questions affecting the disposition of our public lands and the means to be employed in securing desirable settlers and in assisting them to establish homesteads.

At the basis of the agricultural development of Hawaii must be a system of small holdings farmed by independent owners. A system in which no land speculation finds a part, but which looks to each parcel of land being settled and developed by its first possessor with a view to the permanent establishment of a home.

That the number of agriculturists from whom these islands may hope to derive residents is by no means small is evidenced by the fact that over one hundred thousand letters are annually received by the United States Reclamation Service from land and home seekers. The desire of these prospective settlers is to be informed upon every conceivable condition which may affect the value of procurable land—its situation, its potential qualities as a crop producer, the accessibility of water and of markets, the conditions of climate, the means of communication and the surrounding road systems.

In order that the advantages of Hawaii to home builders and to agriculturists may be brought before intending settlers, it is necessary that exact information of Hawaiian land conditions be drawn up and deposited with the United States Reclamation office. By this means the Federal Government will be in a position to put these islands into direct touch with enquirers who are looking for land which affords opportunities similar to our own. Such information in order to be of value, must be definite and complete.

It should give the situation and price of available land, the suitable crops to grow and the method of handling them. It should state the amount of capital which is necessary to establish a farm of a definite size and the prospective income to be derived therefrom. And in this connection it is well to remember that it is not the cheap land which brings the desirable settler, but the land of real potential value, which costs a fair price and holds out the prospect of good returns to men of enterprise and intelligence. Poor land frequently means poor settlers, not so much measured by possession of concrete wealth as by the meagreness of mental equipment with its concomitants, the lack of intelligent perseverance and resourcefulness.

In comparison with some parts of the mainland it may at first appear that the price of Hawaiian land is excessive. However, when the splendid potentialities of our islands are

into consideration and the unusual opportunities open to the grower of tropical crops, the dissemination of the claims of this Territory upon the agriculturist will attract settlers from sources best calculated to establish permanent communities of well-to-do and enlightened citizens.

MONSTERA DELICIOSA.

One of the most interesting of the decorative climbing plants in the Honolulu garden is the species of *Philodendron*, *Monstera deliciosa*. In favorable sites upon old walls or upon trees it grows freely, and its generous sized leaves ornamented with a margin of oval perforations, together with the somewhat snake like form of its mottled aerial roots gives the plant an unusual and attractive appearance.

Although unexpected, this somewhat weird creeper yields one of the most exquisite and delicate of tropical fruits. The flowers are small and unpretentious, but are surrounded with a large white spathe as other members of the *Araceae*. The spathe, which is vivid green in color, becoming duller as it matures, consists of a quantity of hexagonal sections arranged spirally upon the central stem. Those who are familiar with the pineapple will notice the similarity of its fruit to the *Delicosa*, which latter may be likened in appearance and construction to a greatly prolonged but much narrowed green pineapple without the latter's decorative crown or generous coloring.

When fully grown the *Delicosa* measures about fifteen inches long and three in diameter.

The taste of this exquisite fruit is to be described as partaking of a mixture of tropical flavors in which that of the pineapple predominates. When ripe it diffuses a very fragrant odor. One peculiarity of the *Delicosa* is the length of time which the fruit when fully grown requires to ripen—a period of many months elapsing before it is ready for the table. Another unusual characteristic is that it commences to ripen from the end and is only suitable for consumption in sections—two or three inches being available for eating daily. In this way a good sized fruit lasts some days, the exterior hexagonal sections becoming detached and revealing the ripened sections within.

To all who are fond of fragrant fruits the *Delicosa* is recommended. Its peculiar growth and unusual characteristics make it an object of great interest, while its delicious fruit possesses a luscious flavor which few other varieties can claim.

PROPOSED VOLCANO LABORATORY.

The special committee recently appointed to secure the necessary local contribution towards the seismic observatory proposed to be established on Hawaii by the Massachusetts Institute of Technology, has met with encouraging support, and it is announced that more than two-thirds of the requisite annual grant has been provided.

Professor Jaggar, who lately presented the plan, has now left for Boston to complete arrangements with the Institute for the inception of the work. He proposes to return in October accompanied by the specialists who will remain in charge of the laboratory.

Professor Daly is now on Hawaii making a preliminary study of its volcanoes with a view to future work in connection with the proposed observatory.

HAWAIIAN FISHES AT SEATTLE.

A notable achievement has been scored by the safe transport of a collection of Hawaiian fishes to the Alaskan exhibition. The great susceptibility of aquatic life to change of temperature and the difficulty of maintaining suitable conditions during a long sea voyage rendered the experiment of transferring the collection an extremely difficult one. The fish were conveyed on the U. S. Army transport Dix in charge of Mr. F. A. Potter, superintendent of the Honolulu Aquarium. The brilliant coloring of the Hawaiian fishes and the grotesque and fantastic shape of many of the species should prove an attractive feature of the local exhibit.

ENORMOUS SUGAR CROP.

The dual mill of the Hawaiian Commercial & Sugar Company on Maui has just closed down after a record run of grinding without a stop since November. During this time fifty-two thousand seven hundred and twenty-five tons of sugar were produced from a little more than three hundred and seventy-six thousand tons of cane. A brief consideration of these figures, which relate to only one plantation, give some idea of the magnitude the Hawaiian sugar crop is assuming—

THE PAPAIA.

paper in *Science*, by an officer connected with the Porto Rico Experiment Station, reports a change of sex observed in the papaia trees in Porto Rico, brought about apparently by ringing the terminal bud. A tree which had previously borne staminate (male) flowers only, had its terminal bud injured, and shortly afterwards was noticed to bear pistillate (female) flowers. These flowers set and yielded fruit, and this was repeated the second year. Further data are being collected on the subject.

FLOWERS.

The flower business of the Islands is largely in the hands of Hawaiians and Japanese. Carnations, violets and asters flower best continuously, especially at elevations above 1,000 feet. The Honolulu market is well supplied with flowers, such as they are, but a number of florists find it profitable to bring considerable quantities of the finer classes of cut flowers in cold storage to San Francisco. The opportunity is open in the production of the finer types and strains of cut flowers, ferns, greenhouse plants and ornamentals, as in the case of vegetables of improved sorts.—Jared G. Smith.

GRAPES.

Grapes have been cultivated in Hawaii ever since the first Portuguese settlers arrived, but the industry has only just begun to attain commercial proportions. There are two wineries in successful operation and plenty of room for others. Because of the equable climate, and the absence of frost, the vine can be made to fruit at almost any season of the year, by pruning. The main crop comes in the autumn, but there is hardly a month when grapes are not obtainable in the Honolulu market. There is a good opening for the cultivation of table grapes to supply the Pacific coast markets during the six months of the year from December to June. It is believed that any one who understands the cultivation of this crop who will undertake grape growing on a fairly large scale and on suitable land cannot fail to realize large returns. The yields of grapes, where these are grown for wine making, have been considered satisfactory, and the industry is expanding rapidly. The wines are mainly of the Madeira type. There is a large local market for cheap wines among the Portuguese, Hawaiian, Spanish and Japanese population, so that there is room for building up a considerable wine industry in Hawaii.—Jared G. Smith.

COPRA.

There appears to be great variation in the quality of copra placed on the market, despite the fact that a good quality product is always in satisfactory demand. The copra produced in Ceylon and in the islands of the Pacific, where large European soap-making and other firms have extensive interests, is always of high quality, and commands the best price. Copra from the Malay States, however sells at a secondary price, and is reported to have frequently been prepared in an unsatisfactory manner. While the best copra at Singapore sells for about \$7.50 per picul (133½ lbs.), the market price of lower qualities is often \$1.00 per picul below this. These lower grades are usually prepared on estates owned and managed by Malays and Chinese.—*The Agricultural Notes*, Barbados.

GUAVA JELLY.

A press bulletin has recently been received from the Florida Agricultural Experiment Station on Guava Jelly from which the following is quoted:

Undiluted guava juice consists of over 90 per cent. of water, about 5 per cent. of sugars, and a small percentage of pectin and acid. It also contains some substances which give the color and flavor to the jelly made from it. Pure guava jelly usually contains about 20 per cent. of water, about 75 per cent. of sugars, and the rest is pectin, acid, etc. During the boiling of the mixture of juice and cane-sugar, the acid acts on the sugar, and changes part of it into invert sugar, so that it forms a sirup; and if there is enough acid the sugar will not crystallize out. This strong sirup causes the pectin to set as a jelly. The pink color is deepened by longer boiling, or by more acid.

When boiling the jelly, the temperature rises as more and more water evaporates. To secure a uniform jelly, it is desirable always to stop at the same point. This can best be done by the use of a glass thermometer. Such an instrument, reading to 300° F., can usually be bought from a drug store. In a series of tests it was found that the best jelly was made when the boiling was stopped at 235° F. It is usually necessary to stop the boiling for a moment, when using the thermometer, because of the bubbling. If the same amount of water is always used in cooking the ripe guavas, and the same proportions of juice and sugar are taken, and if the temperature which is found to give the best jelly is measured with a thermometer, it will be possible to turn out a uniform product year after year.

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Albert Koebele's phenomenal success with *Novius cardinalis* against *Icerya* in California in 1889 was the starting point for a new regime in applied entomology, especially in States bordering on the Pacific and in these islands. The blessings stored in the utilization of beneficial insects, that were but dreams until then, suddenly appeared to suffering farmers in unquestionably practical form. Here was a source of relief from insect depredations that was inexpensive, possessed of numerous qualities making it immeasurably superior to artificial warfare and opening a vista of ease and profit beyond the dream of avarice. Such was the hue in which Koebele's brilliant achievement was seen by the average fruit grower and horticulturist, uninitiated into the intricacies of applied entomology. Indissolubly coupled with the work of ransacking the world for beneficial insects was the institution of inspection and quarantine of all live vegetable matter imported into the State. The first to enjoy the benefits of a useful insect, California was the pioneer to establish (1890) entomological inspection of which the late, lamented Alexander Craw was the head.

Of the benefits of a beneficial insect Hawaii first tasted in 1890, and in 1893 she retained the services of the ablest collector of man's insect friends and enjoys them to the present day. The horrible depredations of the sugar cane leaf hopper induced us in 1904 to bring to our shores the most expert of inspectors also, and this effectively closed our gates against invasion by insect pests. Our isolated position permits of most thorough exclusion, though our anchorage in Mid-Pacific, surrounded by countries similar in climate and inhabited by countless potential pests, makes our situation precarious *unless our inspection is most vigilant*.

It is not the writer's belief that all artificial remedies are to be abandoned in anticipation of relief from insect friends. No general rule can be made in this respect, depending as it does upon the conditions surrounding the affected crop. It was absurd to attempt artificial remedies against the cane leaf hopper; it would be equally absurd for one cultivating citrus trees on these islands for profit to let his trees suffer from damage

by aphids, while awaiting effective attack by their parasites (an ultimate certainty), when an application of soap solution would kill all the aphids on his trees at one fell swoop. The aphid-destroying insects are in this case useful where artificial battle is incompatible with circumstances, as inaccessibility, laxity or poverty of owner, to reduce the numbers that would migrate to the cleansed area. No insect, native or foreign, is anywhere destructive without suffering from attacks by some enemies. To the immediate relief of the threatened crop we must bring either its depredator's enemies or insecticides. The latter must be used if practicable until the former be found. Natural enemies are preferable and always worth searching whenever circumstances permit. That the work of introduction of our insect friends from foreign lands is beset with a certain amount of risk and *should never be undertaken by others than competent entomologists* goes without saying. But in the light of what has been accomplished with direct importation of useful insects here and abroad it seems utter folly to attempt to misrepresent or discredit it. Thus, although Dr. Marchal's memoir was published in 1908 (Popular Science Monthly, April and May), and he speaks of the Koebele and Perkins expedition to Australia in quest of parasites of *Perkinsiella saccharicida*, he does not give the brilliant result of that expedition! Less pardonable still is Mr. Froggatt's belittling account of the result of this expedition. Mr. Froggatt is the eminent Australian entomologist who, commissioned by four Australian States to investigate principally fruit fly enemies and remedies, spent about a month in our midst about two years ago on his way around the world. For the workers directly engaged in the work of introducing, breeding and distributing beneficial insects, for the scientists and businessmen to whose attention whether in a scientific or commercial way the work of these insect friends is brought daily,—for these people Mr. Froggatt had little time to spare. Such attitude presaged not only the trend of his forthcoming report but also reflected the prejudiced frame of mind in which he must have set out on his expedition, unscientific as it would seem. Mr. Froggatt's report on entomological work in Hawaii is set forth in his preliminary letters published in the Agricultural Journals of the States he represented, and his final report appears somewhat more fully in a special publication received a short time ago.

To correct Mr. Froggatt's evident errors we reproduce below a note from a recent number of the Hawaiian Planters' Monthly, also quote the major portion of a paper recently published by the eminent Italian scientist, Dr. F. Silvestri, which has direct bearing on our entomological work and method. Dr. Silvestri spent also about a month with us about a year ago and embodies his observations in this paper. We took

the time to translate his paper and the pleasure now to publish it, because in the original Italian it would have remained a dead letter to most of us. It remains for us only to express our gratitude to Dr. Silvestri for the fairness with which he studied and reported on our work. His paper contains besides a fund of valuable and absorbing information, which would interest and pay our readers to peruse.

OUR MELON PEST.—Both Dr. Silvestri in the quoted paper as also the editor of *The Planters' Monthly* as quoted below emphasize the importance of making a determined effort to introduce its enemies. No known artificial remedy can be depended on for relief from the pest, with the possible exception of *prompt burning of everything infested by this fly uniformly practiced* on these islands. The treatment the fly receives at our hands now is rather encouraging than otherwise. Many people decide to "take a chance" and plant the fly's favorite dishes, which are promptly attacked by the fly, abandoned by the erstwhile enthusiastic grower and left to breed and multiply and fill the earth with the fly. The pest is thus virtually propagated and released in our midst to continue the work of destruction. Unfortunately this is true not only of our amateur gardeners, but also of our professionals. In fact our commercial gardeners, Orientals most of them, are the principal sinners. In their dense, impenetrable ignorance of the laws of life surrounding them, by their failure to destroy infested material, they breed myriads of melon fly even to their own undoing. By their practice to cover fruit after setting they may raise a somewhat larger percentage of fruit, but they do not diminish the fly nuisance. Wholesale destruction of infested vines and fruit is bound to reduce the numbers of the fly to reasonable limits, at least. But in the absence of a common language it is virtually impossible to stop the practice of neglect among these gardeners. Laws are powerless to cope with the situation unless backed either by intelligent self-interest or by an adequate police force. Under such circumstances the pressing need of parasites against this fly become quite evident. That the need is pressing becomes even more clear when we realize that we lose about three-quarters of a million dollars annually in tribute to this fly allowing but 5 cents per family per day on an estimated population of 170,000, four in the family. So serious a loss will justify adequate allowance for a thorough, determined search for melon fly enemies and import them at the earliest possible date.

In the Italian Dr. Silvestri did not give the popular names of the insects mentioned in his article. In order therefore to make his article perfectly intelligible to all our readers we publish below a table, alphabetically arranged, of the scientific names and terms in it, giving their popular equivalents.

Ablerus, a scale bug parasite.

Acaridae, mites.

Ageniaspis, a moth parasite.

Agromyza, a small fruit fly.

Aleyrodes brassicae, cabbage white fly or mealy wing.

Anagrus, a leaf hopper egg parasite.

Anaphes, a scale bug parasite.

Anastrepha fratercula, a fruit fly.

Anthonomus grandis, the cotton boll weevil.

Aonidiella aurantii, the orange red scale.

Apanteles glomeratus, a cabbage worm parasite.

Aphelinus mytilaspidis, a scale bug parasite.

Aphis brassicae, cabbage aphid.

Aphis papaveris, a plant louse.

Apis lingustica, a bee.

Apis mellifica, honey bee.

Aporia, a butterfly.

Archenomus bicolor, a scale bug parasite.

Aspidiotus, a scale bug genus.

Aspidiotus hederae, oleander scale.

Aspidiotus perniciosus, San Jose scale.

Aspidictiphagus, a scale bug parasite.

Asphondylia lupini, a gall fly.

Blastophaga grossorum, fig insect.

Blastophagus piniperda, a beetle.

Bombus, bumble bee.

Bombus hortorum, bumble bee.

Bombus terrestris, bumble bee.

Braconid, an ichneumon fly.

Calosoma sycophanta, European ground beetle.

Carabids, ground beetles.

Carabus aurantus, red ground beetle.

Carpocapsa, codling moth.

Casoccia, a genus of leaf rolling moths.

Cecidomyid, gall gnat.

Ceratitis capitata, Mediterranean fruit fly.

Ceroplastes rubens, the red wax scale.

Ceroplastes rusci, European wax scale.

Chalcis obscurata, a parasite on chrysalides of moths.

Chilocorus bizulnerus, American lady bird.

Chilocorus circumdatus, the orange lady bird.

Chilocorus similis, Asiatic lady bird.

Chlaenius schrankii, predaceous beetle.

Cicadoidea, cicadas.
Clerus formicarius, one of the "Checkered beetles."
Coccidae, scale bugs.
Coccids, scale bugs.
Coccinella aphidicola, aphid eating lady bird.
Coccinella arcuata, lady bird.
Coccinella californica, California lady bird.
Coccinella nova-zealandica, New Zealand lady bird.
Coccinella II punctata, 11 spotted lady bird.
Coccinellids, lady birds.
Coccophagus, a genus of scale bug parasites.
Coelophora inaequalis, eight spotted lady bird.
Coelophora pupillata, ten spotted lady bird.
Coleopteron, beetle.
Conchylis, a web worm.
Conotrachelus nenuphar, plum curculio.
Copris carolina, a tumble bug.
Cryptolaemus montrouzieri, "Brownie" lady bird.
Cycloneda sanguinea, an aphid eating lady bird.
Cyrena nigellum, a lady bird.
Dactylopius, a mealy bug genus.
Dactylopius albizziae, globular mealy bug.
Dactylopius bromeliae, pineapple mealy bug.
Dactylopius calceolariae, sugar cane mealy bug.
Dactylopius citri, common mealy bug.
Dactylopius filamentosus, the globular mealy bug.
Dactylopius virgatus, the variegated mealy bug.
Dacus, genus of fruit flies. Our melon fly is one of them.
Dacus oleae, olive fruit fly.
Dendroctonus frontalis, a pine engraver beetle.
Diaspinae, or *ni*, armored scale bugs.
Diaspis pentagona, West Indian peach scale.
Dicranotropis vastatrix, a sugar cane leaf hopper.
Diplosis tritici, wheat midge.
Dipteron, two-winged fly.
Echthrodelpax fairchildii, Fairchild's leaf hopper parasite.
Ectophagi, parasites that live on the exterior of their hosts.
Elaterid, click beetle.
Encyrtus fuscus, a scale bug parasite.
Endemys, a butterfly.
Entedon epigonus, a parasite of Hessian fly.
Entomophagi, insect eaters.
Entomophagus, insect eating.
Ephialtes messor, ichneumon parasite of codling moth.
Eucoila impatiens, stable fly parasite.
Euproctis, brown tail moth.
Fulgoridea, lantern flies.
Galerucella luteola, imported elm leaf beetle.
Haemaphysalis leporispalustris, a tick.

- Haematobia serrata*, horn fly.
Haplogonatopus mexicanus, Mexican leaf hopper parasite.
Hippodamia ambigua, an aphid eating lady bird.
Hippodamia convergens, an aphid eating lady bird.
Histerid, carrion beetle.
Hunterellus hookeri, a tick parasite.
Hymencyrtus crawii, Craw's scale bug parasite.
Hymenopteron, transparent winged fly.
Hyperaspis silvestrii, Silvestri's lady bird.
Icerya aegyptiaca, Egyptian cottony cushion scale.
Icerya sacchari, Seychelles cottony cushion scale.
Ixodidae, ticks.
Ixodiphagus texanus, Texas tick parasite.
Lecanium, brown or soft scale.
Lecanium oleae, black olive-scale.
Leis conformis, common spotted lady bird.
Lepidoptera, moths and butterflies.
Lepidosaphes citricola, purple scale.
Lestophonus iceryae, a fly parasite of cottony cushion scale.
Lipernes subviridis, a lady bird.
Lithocolletis, a leaf miner moth genus.
Lycaenidae, blue butterflies.
Lymantria, Tussock moth.
Lyperosia irritans, horn fly.
Lysiphlebius, a parasite of grain flies.
Macrodyctium omiodivorum, parasite on sugar cane leaf roll **et**.
Malacosoma, moth.
Margaropus annullatus, Texas fever tick.
Mayetiola destructor, Hessian fly.
Meda testudinaria, a lady bird.
Megilla vittigera, banded lady bird.
Microterys flavus, a scale bug parasite.
Microzeisea (Pentilia) *misella*, tiny black lady bird.
Midus pygmaeus, a lady bird.
Mineola indiginella, leaf crumpler.
Myianeme comperi, a scale bug parasite.
Neuroptera, aphid lions, ant lions, dobsons and others.
Noctius belus, lady bird, "pretty" Vedalia.
Noctius cardinalis, Vedalia lady bird.
Noctius Koebeli, Koebbe's Vedalia.
Omiodes accepta, sugar cane leaf roller.
Ootetrastichus beatus, a parasite on leaf hopper eggs.
Ophelosia crazei, an ichneumon fly.
Orcus australasia, six spotted blue lady bird.
Orcus chalybeus, steel blue lady bird.
Opiellus trimaculatus, an ichneumon fly.
Orthesia insignis, lantana scale or "Maui blight."
Paranagrus optabilis, parasite on leaf hopper eggs.
Paranagrus perforator, parasite on leaf hopper eggs.

oria zizyphi, black chaff scale.
siella saccharicida, sugar cane leaf hopper.
acaspis eugeniae, the oleander white scale.
sinus bicolor, a bark beetle.
sinus thuyae, arbor vitae bark beetle.
aenia, a genus of moths.
phagids, leaf eaters.
xera, grape aphid or plant louse.
us, a scale bug parasite.
phagous, herbivorous.
brassicae, cabbage butterfly.
rapae, cabbage worm and butterfly.
culidae, a family of parasitic flies (two winged).
mus lividigaster, yellow shouldered lady bird.
ionia, a scale bug genus.
, owl moth.
on conotracheli, parasite of plum curculio.
oleellus, a moth.
tes coriaceus, predaceous beetle.
a berlesei, Berlese's scale bug parasite.
ococcus nipae, avocado (alligator pear) mealy bug.
ogonatopus, leaf hopper parasite.
phorus, a plum moth genus.
aria mammeae, the big cottony scale.
aria psidii, cottony guava scale.
dia, an aphid lion.
cephalus texanus, a tick.
bius coecus,
bius debilis,
bius dorsalis,
bius hirtellus,
bius satellus,
bius speculifer, } Lady birds allied to black lady bird.
bius toowoombae, the Toowoomba lady bird.
bius ventralis, black lady bird.
coccus, a root mealy bug.
videus, a scale bug parasite.
id, engraver beetle.
lista cyanea, scale bug parasite, or Scutellista.
ius australasiae, Australasian lady bird.
ius flavifrons, a lady bird.
ius notescens, striped lady bird.
ius sydneyensis, Sydney lady bird.
gium maculigerum, a lady bird.
gium hirtuosum, a lady bird.
phus curculinis, parasite of plum curculio.
orstilba coccophila, a red fungus enemy of scale bugs.
ophorus obscurus, sugar cane borer.
ylinids, rove beetles.

Staphylinus oleus, a rove beetle.

Stylopidae, a family of parasitic beetles.

Tachinidae, parasitic flies.

Teleonemia lantanae, the lantana leaf bug.

Tetranychus telarus, red spider.

Tetrastichus xanthomelanæ, a parasite on elm leaf beetle eggs.

Thalpochares cocciphaga, a moth enemy of scale bugs.

Thyridopteryx ephemeraeformis, bag worm.

Tillus formicarius, an insect parasite.

Tomocera californica, a scale bug parasite.

Toxoptera graminum, a grain fly.

Trichogramma pretiosa, a parasite on moth eggs.

Tripetidae, fruit flies.

Trithionyx lanosus, a lady bird.

Tyroglyphus phylloxerae, a parasite of phylloxera.

Verania frenata, a striped lady bird.

Verania lineola, a lady bird.

Xylophagous, tree eating.

“As to Mr. Froggatt’s report, (that parasites are of no commercial value in Hawaii and California), it is difficult to understand how any man of intelligence could honestly make such a report. That fighting insect pests with parasites is of commercial value in Hawaii is as firmly established as that the sun shines. The people of Hawaii look upon the entomological department of the government as one of the absolutely indispensable agencies, not only of progress, but of existence to the agricultural industries of the Islands. So strongly is this believed that the sugar planters maintain an elaborate entomological station of their own, in addition to that of the government, the collection, breeding and distribution of insect parasites being the chief work. This station has literally saved the sugar planters of Hawaii millions of dollars within the past few years; a fact that any one can ascertain to the point of demonstration by a day’s investigation in Honolulu. Mr. Froggatt is behind the times. He should wake up.

“As to fruit fly parasites, Hawaii should again and immediately take up with Mr. Compere the securing and introduction of the melon fly parasite. He reported some time since that such a parasite existed in India. The melon fly has practically exterminated musk melons in Hawaii, and raised water melons to starvation prices. No reasonable expense should be spared in securing the parasite to this fly. If necessary an entomologist should be sent to consult with Mr. Compere and make special trip to secure this parasite.”—The Hawaiian Planters’ Monthly, May, 1909.

F. SILVESTRI.

1 Survey of the Actual State of Agricultural Entomology in the United States of North America.

Extracts from "Reprint from the Bulletin of the Society of Italian Agriculturists." Vol. XIV, No. 8, April 30, 1909.

Translated from the Italian by J. ROSENSTEIN.

* * * * For the same purpose (inspection of live vegetable imports) principally, the Territorial government of Hawaii maintains an entomological station at Honolulu with three technical employees. * * *

Before closing the enumeration of laboratories I wish to record that in Honolulu besides the Territorial laboratory with three entomologists, and the Agricultural Experiment Station with two entomologists, there exists also a private one forming part of the experiment station of the Hawaiian Sugar Planters' Association. This laboratory has six entomologists, among them the most able systematist, R. C. L. Perkins, and Albert Koebele, the ablest seeker of insect parasites. This one costs annually not less than \$28,000 and keeps even now two traveling entomologists, one in Europe and one in Malaysia, for the purpose of collecting insect parasites. It also publishes an interesting bulletin of which the second volume has just been completed.

With this last admirable example of what enlightened private associations also undertake in order to be prepared to combat injurious insects, I believe I have enumerated almost all the institutes and laboratories which are occupied in the United States with the safeguarding of an extremely rich and varied agricultural production from the attacks of hostile animals. In summing up I will state that about 200 persons are occupied there in agricultural entomology and that federal and state governments spend for the maintenance of laboratories in the neighborhood of \$800,000. If we add to this what the state of New Jersey and other states spend for the extermination of mosquitoes we arrive at the enormous sum of \$1,200,000. * * *

NATURAL METHODS OF CONTROL.¹

The method of fighting is called natural when other living beings are used to fight injurious insects. Of these, however, up to now insects alone are known, and very partially at that, to be effective.

¹ The whole bibliography on this subject will be given when I shall republish this note with illustrations which I hope to do before long.

Whatever has been attained up to now with the natural method is due to experiments undertaken and carried through in some cases with good results, especially in the United States (mainland) and the Hawaiian Islands. I therefore believe that it would be useful to add to this treatise an account of what has been accomplished in these countries; also what little has been practiced elsewhere following their example. Thus one will get an idea of what has been done in this field and will also be able to understand how much may and must still be tried with prospects of good results.

Facts which make the natural method advisable. It has always been very obvious for anybody, seeing one insect devour another, that injurious insects must also, at least in part, be devoured by other insects, properly called predators.

Acute observers, naturalists and specially entomologists who make a study of insect life, had since remote times had occasion to notice that often from the egg or from the chrysalis of a given insect not an individual of the same species is born, but one or more individuals belonging even to different orders, so that from the larva of a given species instead of passing through the consecutive stages peculiar to it, at a certain moment of its development, larvae of other insects appear because the former has been killed by these larvae of other insects, who devour it from the inside or suck it dry from the outside. These are the parasitic insects, which have been noticed since remote times, and of which the internal ones have been called "entophagi" by Rondani and the external ones "ectophagi" by myself.

Aldrovandi (1602) was the first to observe the exit of the larvae of *Apanteles glomeratus* (which he held to be eggs) from the common cabbage caterpillar and later Redi (1668) published the same observation and another on insects of different species born of the same pupa.

But to Valisnieri belongs the merit to have discovered first the real nature of parasitic insects on others and to have written about the form and biology of many which he had discovered.

About the nature and work of these parasites he wrote, "if sometimes there are born, (from one insect different ones) they are what I should call, false individuals, *being born from a different kind of worms which have been deposited there by their mothers*, so that they may feed off the real native worm. This is a law, ordained in this base world by the Supreme Creator *which I have not yet well understood, that the larger always devours the smaller, and is its tyrant*, a law which I have constantly observed in all forms of life, winged, fourfooted and aquatic."

Cestoni, a contemporary of Valisnieri, in a letter to him speaks at length about the parasites of *Aphis brassicae*, *Pieris brassicae*, and finally of *Aleyrodes brassicae*. He calls the insects of this latter species first "*butterfly atoms*" and then "*little cabbage sheep*" and their parasites, "*wolf-mosquito*."

Several years later (1734-42) Reaumur, in France, published very careful and mostly new observations about many insects and their parasites, and in Switzerland de Geer (1752-78) studied also with great care and with great genius insects in general, including parasites and gave with his classic work, "Memoirs pour Servir a l'Histoire des Insects" one of the strongest impulses to entomology.

At the end of the eighteenth and beginning of the nineteenth century the study of systematic Zoology flourished and many works descriptive of insect parasites were published, among them are recorded particularly those of Dalman, Nees, Gravenhorst, Walker, Westwood, Foerster, and for Italy those of Spinola and Desideri.

But the one who excelled by works of great value (1837-52) about insects injurious to forests and their parasites and who recognized the full importance of the latter in fighting the former, was the German, J. T. C. Ratzeburg. To his works we refer even today as to an inexhaustive mine of observations of great usefulness. But we do not agree with him that man cannot in some way hinder the development of certain parasites.

² The first who to my knowledge not only divined the importance of the parasite phenomenon, but also applied it successfully, was the Frenchman, Boisgiraud of Poitiers. About the year 1840 he freed the poplars along a promenade in the suburbs of his town of *Liparis dispar* by placing there *Calosoma sycophanta*; besides he destroyed *Forficulids* in his own garden using *Staphylinus oleus*, while he obtained no result with *Carabus auratus* against the same insect, for reasons which he was afterwards able to explain. The results of these experiments of Boisgiraud were published in July in 1843 in the "Revue Zoologique" of the "Societa Carvieriana" of Paris.

This new method, original and inviting, traced in the domain of therapy, which then more than now groped in a confusion of empirical methods, inspired in April, 1843, the technical commission of the society for the encouragement of arts and crafts of Milan to offer as premium a gold medal to be given in 1845 to the one who shall have in the meantime successfully experimented with artificial breeding of some carnivorous insects, which may be utilized to advantage for the destruction of another species of insects recognized as injurious to agriculture.

This is a subject which would seem to have been dealt with each in the present century rather than in 1843.

To this appeal of the meritorious society enlightened and singular for its time, responded Antonio Villa, already favorably known

² From here to line .. page .. is entirely reproduced from a recent publication of Prof. Trotter, "Two Precursors in the Application of Carnivorous Insects for the Defense of Cultivated Plants." Redia V., 126-132.

in the world of naturalists, presenting on the 26th of December, 1844, a written memorial in which were set forth at length the results of successful experiments carried on by him in the surroundings of Desio, in the province of Milan.

I will relate enough of it to illustrate the method he followed. Having observed which species of insects mostly infest the plants cultivated in his garden at Desio, where most of the experiments had to be carried on, he decided: (1) To employ climbing carabids to hunt all the herbivorous (phytophagous) insects hidden under the bark of posts and plants, in the crevices of walls and under the bricks of the surrounding wall. (2) Staphylinids to destroy the insects which nest in flowers. (3) Ground carabids for all ground species or such as gnaw the roots and for all cut-worms and other herbivorous insects found on the ground, hence especially for the larvae and other recently born forms.

These experiments lasting nearly two entire seasons resulted so satisfactorily that Villa drew from them the following conclusions:

(1) The disappearance of herbivorous insects and specially of cut-worms which had been multiplying for several years in the places selected by me for experiment must be attributed to their destruction by carnivorous insects placed there for that purpose.

(2) The carnivorous insects after being taken to the places selected for experiment, having found food and hiding places suited to their habits, multiplied with the exception of *Procrustes coriaceus* and *Chlaenius Schrankii*, the former preferring plain mud as food and liking a cooler temperature, the second being accustomed to inhabit moist places, especially the edges of water.

This memorial, the importance of which in the history of applied entomology is without question, was published by Villa during the following year. It appeared under the title: "Carnivorous Insects Used to Destroy Species Injurious to Agriculture." and added to it is a table enumerating the principle carnivorous insects of the Milanese district which may be employed for the destruction of herbivorous insects; also an "Extract of the Award" of the technical commission of judges and some "addenda" relative to the observation made in the meantime and which he concludes with the following passage which I take pleasure in reproducing in its entirety:

"May I be permitted to hope that others, taking an interest in the subject which gives hope of general usefulness and in which I for my part have the firm intention to multiply observations and experiments, may derive some profit from the facts which I have set forth, and may I be permitted to wish that it may not be long before the farmer, informed of the nature of his surrounding objects and distinguishing those which may be useful to him from others which live on his labors, he may not have to confound any longer the one kind with the other in general and blind

rejection and to crush with improvident foot and without distinction his natural helpers together with his natural enemies."

The work of Villa, praised in principle and method in the various Italian and foreign periodicals which reviewed it, received also bitter criticisms not immune as it seems from personalities, specially on the part of Carlo Bassi, another Milanese naturalist, an acquaintance if not a friend of Villa. In his criticism he allowed himself to be influenced too much by a brief statement of Ratzeburg.

The celebrated entomologist, author of the classical work *Die Ichneumonien der Forst-Insecten* (1844), speaking of carnivorous insects wrote that they can be applied to the needs of agriculture only by the beneficent hand of nature, and that every effort to assist it must be in vain.

Against the often biting criticism of Bassi, which was in many points rather unfounded and puerile, G. Stabile rose with an article in sympathetic defence and shortly thereafter also Villa himself. Later on, that is in 1847, he found himself compelled to give a new reply in consequence of another criticism by Bassi, who was joined by the noted physician Bellani, drawing into his recriminations, without any good reasons, a previous work of Villa on locusts. (End of quotation from Trotter. Trans.)

Since 1850, Rondani, the Italian entomologist, a man of genius, takes first rank as a student of insect parasites, having studied in particular Dipterous and Hymenopterous parasites and entomology in general. He fully appreciated the importance of entomophagous insects in fighting the injurious ones and, in order to secure appreciation also among agriculturists, he tried to show them the number of the one kind and the other, by publishing his "Account of Parasitic Insects and Their Victims" in two parts, giving in the first a table of parasites known as enemies of injurious insects and in the second a table of harmful insects and their parasites.

In many places in his publications Rondani calls the attention of agriculturists to their natural assistants in the fight against phytophagous insects and in the memorandum entitled "The Birds and the Injurious Insects" he expresses himself as follows: "These (the parasitic insects) are the true friends and allies of the agriculturist although little or poorly understood and therefore, persecuted through ignorance. They are the most powerful, if not the only means of which nature avails herself to maintain the equilibrium among the species that live together on this earth because not one of them can increase very much without becoming fatal to others; it is through these that the devastations of other insects injurious to fields, gardens or forests, do not become complete, or are limited or cease altogether; not so much is this the case with birds to whom the policing of the fields can not be entrusted, because they are unreliable and kill the guilty together with the innocent, they are robbers as well as guardians of

the field products and therefore do not yield the most and sometimes any calculable advantage if not even more harm than good in the very things which were sought to be saved by their means."

He also explicitly admitted that the knowledge of entomophagous insects is necessary for their useful application in agriculture and in fact in the prefaces to the two parts of his "Account" he wrote in this respect: "May these collections of notes on entomological parasitism have the effect to turn the attention of students of natural history to this interesting part of entomology so that new material may be gathered to amplify the work which I myself have little more than initiated and that it may result in ever increasing usefulness in the application of this science. These few hints I consider sufficient to bring into view the importance of applied entomology which is related in many respects to vital interests of human society; therefore I am confident that the long and fatiguing labor involved in this account may be received as a work not indeed void of interest, and that it may be of advantage for useful application." While the indefatigable and ingenious work of Rondani was in progress our other entomologists lined up to praise the work of entomophagous insects, especially during the dispute about the greater or lesser usefulness of birds to agriculture which arose in 1868 and which was kept up for several years.

Ghiliani in various memoranda sustained the utility of entomophagous insects in conformity with Rondani, Sabbioni defended the same argument, and Dr. T. Bellenghi, referring to the same Rondani³ spoke prophetic words which will bear repetition to agriculturists even today, namely: "Entomological parasitism has a future and in it more than in anything else Italian agriculture must put its faith."

In France Perris in his beautiful monograph on seashore pine insects also noted the importance of entomophagi in the destruction of xylophagids and phyllophagids, and in 1873 he too went out into the field to prove the usefulness of parasitic insects in preference to birds for fighting injurious insects. Girard advised to introduce carnivorous insects in gardens and the "Society of Agriculture of France" propounded the question: which are harmful and which useful insects?

Finally in the year 1872, Decaux, also of France, began to propose the utilization of insect parasites and continued as we shall see in what follows to recommend always with deep conviction and great enthusiasm, up to the year preceding his death (1889), the use of parasites in the fight against injurious insects.

With 1873 the period in which the Italians, with Rondani at their head, showed any interest in study and general research of insect parasites came practically to a close for many years; the

³ Boll. del Comizio agrario, Parma V., 1872, in note page 11 of the extract.

same was true of the few Frenchmen with the exception of Decaux.

PROGRESS IN THE NATURAL METHOD OF WAREFARE IN THE
UNITED STATES.

In North America on the other hand the new era for agricultural entomology was initiated about 1870 and here the natural method of control was to receive its greatest impulse and was to yield its first surprising results not only to the country which had the will and the power to apply it on a vast scale, but also to other nations.

I.—Advices for the Utilization of Insects Parasitic on Destructive Insects in the Same Regions in Which Both are Indigenous.

It has been seen that Boisgiraud in France and afterwards Villa in Italy were the first to experiment in fighting harmful insects with predatory ones and that many authors recognized also the great importance of endophagous parasites, but I believe that the American entomologist Riley was the first to think of protecting the latter and to recommend a method by which the noxious insects could be killed and the endophagi set free. In fact in 1871⁴ in regard to *Mineola indiginella*, Zell., an insect which attacks apple and other fruit trees, he recommended as follows: "The orchadist has but to bear in mind that it (*Mineola indiginella*) is single-brooded, and that it passes the winter in its case, and he will understand that by collecting and destroying these cases (attached to branches) in the dead of the year when the tree is bare, he effectually puts a stop to its increase. If this fact were more generally recognized, we should see fewer of these insects in our orchards and nurseries. Whether collected in the winter or pulled off the trees during the spring and summer, these cases should always be thrown into some small vessel, and deposited in the center of a meadow, or field, away from any fruit trees. Here the worms will wander about a few yards and soon die from exhaustion and want of food; while such parasites, hereafter mentioned, as are well developed or in the pupa state, will mature and eventually fly off. In this manner, as did Spartacus of old, we swell the ranks of our friends while defeating our foes."

"The practical value of this suggestion," writes Riley, in another place in 1894, "was afterwards completely demonstrated specially by D. B. Wier, who at a meeting of the Horticultural Society of Illinois, as secretary of a committee instructed to consider the best methods to assure coöperation in the fight against insects harmful to fruit-trees, announced that the method (of Riley) gave favorable results."

⁴ Fourth report, Insects of Missouri, 1871, page 40.

The same Riley recommended treatment also for *Thyridopteryx cphemeraeformis* Haw. and Prof. J. H. Comstock advised to place the chrysalides of *Pieris rapae*, gathered by hand, in boxes covered with wire netting so as to permit an easy exit to their parasite, *Pteromalus puparum*, and to impede that of the butterflies that develop from healthy chrysalides.

As the principle has thus been clearly established and on it advices were based for a fight which had the end in view to kill the harmful insects and save their parasites it was and still is possible to recommend for each case appropriate methods besides those already described.

Dcaux in France from 1872-1889 showed himself greatly in favor of such a method and recommended repeatedly to collect the injurious insects, keep them in laboratories located in the gardens (or in other places where there are plants to be defended) and to place them in vessels covered with gauze. The agriculturists should visit such laboratories daily and set free the entomophagous insects killing on the other hand the adults of the pests. He recommended the protection of the predators as well as the endophagi and ectophagi and in order to educate the agricultural public, he proposed that biological collections should be made and memoranda published on the habits of injurious insects and their parasites.

So we see that Dcaux had devised a complete organic plan for a rational natural fight against noxious insects, a plan which we recommend fundamentally even today. Notwithstanding the example of the glorious period of Rondani the agricultural entomologist of Italy up to 1900 neglected almost entirely the biology of harmful insects and their parasites and never thought of natural methods of battle. In 1892 we hear the first voice in sincere protest against the way things were going in agricultural entomology in our country, raised by Dr. Ginseppe Jatta who, having been for several years professor of agricultural entomology at Portici, had occasion to notice how limited and uncertain was the knowledge of noxious insects and how much less that of fighting methods, all of which were recommended on a basis of insecticides and by somebody with relative speculations..... scientific.

Targioni, who was for many years director of the royal station of agricultural entomology at Florence, did almost exclusively systematic and insecticide work as did also his assistants, A. Berlese (1886-90) and G. Del Guercio, although about 1900 the latter made the attempt to take up also biology. Berlese became in 1890 professor of general and agricultural zoology at Portici and for many years, as director of the entomological laboratory, recommended principally the use of insecticides two of which were proposed by himself, without thinking of natural methods of control until in 1900, finding himself in the grip of *Icerya purchasi* Mask., which he had raised in a hothouse during

the year 1897, he was compelled to consider the results obtained in America and Portugal in fighting this scalebug with a predatory insect.

In 1900, in the preface to his "Insects Noxious to Fruit-trees and Grape-vine" he recognized the importance of insect parasites and recommended the greatest regard for them in the use of insecticides against injurious insects. He condemned winter-cures in the majority of cases, saying that they *should be limited to the destruction of those stages which do not harbor parasites*.

In 1901 he read before the congress of the Zoological Union at Naples a paper under the title "The Advantages which Agriculture may Expect from the Work of Insectivorous Birds," setting forth reasons rather in favor of entomophagous insects and against birds as sustained by Rondani, Ghiliani and others. In 1902 he wrote several articles on the natural methods of fighting insects still recommending that in fighting them with insecticides regard should be had for their parasites and proposed, against *Conchylis*, to collect its larvae and chrysalides and place them in small boxes having on their covers a large opening protected by wire netting of 1 mm. mesh so as to permit the escape of parasites and not of the adults.

He announced this method of fighting as new, but, as we have seen, it had already been suggested along the same lines by Comstock for *Pieris rapae* and in a similar manner by Riley (1870) and by Décaux (1872-1889) for other insects.

I myself recommended the use of small boxes with wire netting in order to leave the way open for parasites, to fight *Dacus oleae*, *Prays olcellus*, *Asphondylia lupini*, and with Martelli, I pointed out a natural method against *Ccroplastes rusci*. Besides, in my lectures on agricultural entomology I recommended a natural method of fighting *Pieris*, *Aporia*, *Lymantria*, *Euproctis*, *Plusia*, *Malacosoma* (also for their eggs), *Carpocapsa*, *Conchylis* and *Eudemys*, *Fabrus*, and many other insects.

To fight *Dacus oleae* I recommended also to cultivate in the olive-groves various plants on which live insects parasitised by the ectophagi of *Dacus*.

In the United States one of the gravest entomological problems is really the fight of *Anthonomus grandis* Boh. Not having succeeded there in finding the parasite peculiar to *Anthonomus*, they tried to check its damage by cultural methods and having further established that the parasites of other Curculionids now attack also *Anthonomus* they contemplate increasing the number of such parasites by planting in the cotton fields or around them other plants which are attacked by insects whose parasites have adapted themselves also to *Anthonomus grandis*.

Besides drawing profit from parasites of a given species in one and the same locality experiments have been made with parasitic insects transported from one place to another of the same region

and also from one region to another of the same continent and from one continent to another.

II.—Advices to Utilize Insects Parasitic on Insect Pests by Transporting them from One Locality to Another of the Same Region.

Riley ⁵ seems to have been also the first to distribute parasites of a certain species from one locality to another of the same region. He did this with parasites of *Conotrachelus nenurphar* Hbst. (*Sigalphus curculionis* Fitch and *Porizon conotracheli* Riley) sending them from Kirkwood, Mo., to other parts of the same state. He made the same suggestion also for several parasites of *Coccids*.

Le Baron also (1871-1872) transported little branches covered with scalebugs of apple trees infested by *Aphelinus mytilaspidis* from one locality in Illinois to another (from Geneva to Galena) with good results.

In such cases, as is mentioned also by Riley, it had not been first determined whether in the new localities into which parasites had been transported, these existed already or not, I would rather add that it is almost certain that they were there already and I insist that a method by which it is intended to transport parasites in the same region from one locality, where the harmful insects are much infested to another one where the same insects are hardly infected, is to be recommended when economy and other circumstances permit of it.

Dcaux made in France several experiments in transporting parasites from one place to another, among them *Tillus formicarius* Oliv. He collected a certain number of specimens of this insect living at the expense of xylophagous insects, in the first part of April and brought them to the pines at Cayeux, a distance of 200 kilometers, where they developed rapidly, their larvae destroying those of the Colopteron *Blastophagus piniperda* F. which had increased in that locality to an alarming degree.

He operated in an analogous manner to combat *Phlocosinus thuyae* Perris and *Ph. Bicolor* injurious to the Thuya plantations of the nurseries of Paris.

I have recommended the transportation of larvae of *Prays* parasitised by *Argeniaspis* to a locality where this parasite is very scarce because by this operation one would certainly succeed in re-establishing the equilibrium in a lesser number of generations than would be required if all were left to natural local conditions. In the United States in 1907 a similar experiment was carried out by Professor Webster with *Polygnotus*, parasite of *Mayetiola destructor* Say. He had on the 8th of April many puparia of this *Cecidomyid*, 90% of them parasitised by *Polygnotus*, transported from Maryon, Pa., to Sharpsburg, Md., where the parasite

⁵ Third Report, Insects of Missouri, 1870, page 29, and Fifth Report, 1873, page 90.

had not been observed; on the 8th of July puparia of *Mayetiola* collected in this latter locality and examined in Washington were all found parasitised.

The same Prof. Webster in the same year tried to combat *Toxoptera graminum*, in Kansas, transporting there parasites of the genus *Lysiphlebus* of Texas, but this experiment proved a failure.

Mr. Maskew, technical agent of the U. S. Entomological Laboratory at Whittier, Cal., told me that in California good results had been obtained against *Schizoneura lanigera* by collecting on the hills and mountains large quantities of *Coccinella californica* and *Hippodamia convergens* and transporting them to the apple orchards which were to be defended against the attacks of the destructive Aphid.

III.—Advice and Experiments for Using Insect Parasites from Other Regions or Other Continents Against Insects Coming from these same Regions or Continents.

So far we have seen that the experiments and recommendations in the protection and utilization of entomophagous insects have been with those taken from one locality to another of the same region without assurance that where they were taken there were not in existence already, at least in small number, the same entomophagi or that before long they could not have arrived there in a natural way. But the entomologists of the United States did not confine themselves to these experiments. They transported entomophagi from the eastern to the western states and vice versa and they also navigated the oceans to seek those which could be of special use against harmful insects which had been introduced from across the sea.

Their example was followed with the greatest enthusiasm in the Hawaiian Islands, in West Australia and slightly in other countries.

According to Riley the Rev. C. J. S. Behtume in Canada was probably the first entomologist to suggest the importation of the European parasites of *Diplosis tritici* to North America, supposing that they could have fought *Diplosis* in America as well as in Europe, but the importation of these parasites was never carried out.

In 1873 when all Europe and specially France sought for better means to destroy the phylloxera they thought also of the enemies it might have in North America, and since Riley had just described a *Tyroglyphus phylloxerae* which seemed active against these insects, he sent in 1873⁶ specimens to Planchon, France, where it became acclimated but without the hoped for results.

In 1874 efforts were also made to send from England to New Zealand several parasites of Aphids which had multiplied in the latter to an alarming degree, with the result that the *II-pointed*

⁶ Sixth Report, Insects of Missouri, 1874, p. 55.

Coccinella L. became acclimated; but little is known about the results of this introduction.

Howard, who made a special study of Hymenopterous parasites, called attention in 1880 to the ease of transporting parasites of Coccidae, especially during winter and advised the introduction of *Tomocera californica* from the Pacific coast to the eastern states where it might have attacked various species of *Lacnium*.

In 1883 the Department of Agriculture⁷ succeeded in introducing pupae of *Apanteles glomeratus*, parasite of *Pieris rapae* and other species having them sent from England by G. C. Bignell of Plymouth.

These parasites were distributed in various localities of Columbia, Iowa, Nebraska, Missouri and acclimated there splendidly, spreading everywhere.

With this last experiment very evident proof had been furnished of the possibility of acclimatizing parasites of one country in another and it had been possible to establish also their efficacy, but as the insect in question was a pest of vegetables which in America already had other parasites, the fact was only considered technically by entomologists. There occurred also another experiment which called for attention by its perfect result and by the value of the industry it saved so that the method of fighting exotic insects with the insects that destroy them in their original home received solemn sanction and was recognized as the only method to be always followed in similar cases and to be tried in others also.

The occasion for such an experiment presented itself fortunately also in the United States where the strong will to act is sustained in the people by the means necessary to the work. The insect to be fought was *icerya purchasi*.

Iccray purchasi, Mask.

This scalebug, which becomes specially dangerous to citrus fruit, but which attacks also numerous other plants, seems to have been introduced into California about 1868 and probably on *Acacia latifolia*.

Hardly had this *Icerya* and the rapidity with which it spread in the orange groves been noticed than a general alarm was felt among California orange growers and all possible artificial means to fight it were tried but in vain. It continued to spread notwithstanding all the measures which had been tried without consideration of expense and soon the fruit growers became discouraged and decided to cut down the orange and lemon trees and to substitute other industries. Under these conditions Riley, as head of the entomological office of the Department of Agriculture, considered it necessary about 1884 to establish two labora-

⁷ Report of the Entomologist in Rep. U. S. Dept. Agri. for 1884, p. 323

ories in California, one at Los Angeles and one at Alameda for the purpose of studying with all care the best means for fighting scalebugs and specially *Icerya*, and joining Coquillett in recommending fumigation with hydrocyanic acid, as the means most liable to protect the citrus trees against this scalebug.

But while Riley instituted experiments with artificial means he did not lose sight of the natural method, which he had recommended for other insects and continued to gather information from foreign entomologists in order to ascertain the original home of *Icerya*. After a voyage which he undertook in October, 1887, and during which he had the opportunity to see at Paris the collection of scalebugs by Signoret and to convince himself that *I. sacchari* was a species distinct from *I. purchasi* he made up his mind that very probably the latter was a native of Australia. Coming back then to what he had already written in 1886, in a report as entomologist of the Department of Agriculture, and to what he had said in a lecture before the agriculturists of Riverside, California, in 1887, and in a paper presented to the Philosophical Society in Washington in the winter of 1888 and in other places he recommended with all his influence to introduce the natural enemies which *Icerya* had in Australia.

He tried before all to secure living specimens of the enemies of *Icerya* by the aid of Mr. F. L. Crawford of Adelaide (South Australia), who succeeded in sending in 1888 several lots of living specimens of the Dipteron *Lestophonus iceryae*, Will. This species became acclimated in California, but its activity was obscured by *Noctius cardinalis* which was imported shortly thereafter.

Riley, insisting on the necessity of sending an entomologist to Australia to study there the active enemies of *Icerya* and supported by public opinion in California, echoed before Congress by one of their representatives (H. H. Markham), was finally granted in 1888 the addition to the commission to the Melbourne exposition of two agents of the entomological division, one of whom was to have charge of the research work and the sending of parasites.

For this work the sum of \$10,000 was appropriated and Albert Koebele was selected and specially entrusted with the study of the natural enemies of *Icerya*.

A happier choice could not have been made, because Koebele from that time till now has always proved a man exceptional by his enthusiasm and by his ability in the search for insect parasites.

Koebele departed for Australia in August, 1888, and upon arrival, hardly touched the northern part of Adelaide when he found the first *Noctius cardinalis* and could observe its activity. He succeeded in course of few months to send five lots to California where in all 514 specimens arrived alive. They were first raised on citrus trees strongly infected by *Icerya* under the

protection of tents and in April, 1889, they were set free and distributed in various parts of Southern California.

The activity of *Novius cardinalis* in the same year (1889) was extraordinary, miraculous! as was apparent to everybody, and William F. Charming of Pasadena, in a letter to Riley in 1890 expressed himself as follows:

"We owe to the Department of Agriculture the saving of our orange industry by the importation of the Australian coccinellid, *Novius cardinalis*.

"The white scalebugs (*Icerya*) covered our orange trees with a horrible leprosy. They spread with surprising rapidity and would within a few years have made impossible the cultivation of citrus fruit on the whole North American continent. *Novius* achieved the task of destroying entirely the *Icerya* within a few weeks wherever it has been introduced.

"In the spring of 1889 I had given up my young orange trees (Washington Navel) as irredeemable.

"These same trees (on account of *Novius*) have yielded in the winter of 1890 from two to three boxes of oranges. The result of the introduction of *Novius* is that many hundreds of thousands of orange trees have been saved this spring in Southern California."

And rightly Riley added in 1894: "In other words the victory over scalebugs has been complete and will practically remain such."

The story of the introduction of this pest, its spread for over twenty years, the discomfort it caused, and the numerous experiments carried out to fight the insect and the final reduction to a negligible quantity by means of a small, apparently insignificant Coleopteron introduced on purpose from Australia will always remain one of the most important chapters on the records of applied entomology.

Besides *Novius cardinalis* Koebele introduced from Australia to California the following species: *Novius Koebelii*, Olliff., *N. bellus*, Blackb., *Novius sp.* and the Hymenopteron *Ophelosia crawfordi*, Ril., which had been first observed at Adelaide by Crawford.

ICERYA PURCHASE IN NEW ZEALAND.

When Koebele visited New Zealand during the first month of 1899 he found *Icerya* spread in Auckland and Napier in which latter locality he could collect also very many *Novius* which has been introduced from Australia.

Icerya existed also at Nelson and deserves to be recorded on account of the story of the introduction of useful insects. Mr. Tinline having read in 1887 in South Africa at Cape Town a paper by Ormerod, according to which a coccinellid fought *Icerya* there, secured 120 living specimens of this insect (*Rodalia*

iceryae, Baly) and sent them to Nelson, where a large part of them arrived alive and were placed under a tent with scalebugs. Few days after a strong wind carried away the tent and nothing seems to be known about the result of this introduction.

ICERYA PURCHASI IN SOUTH AFRICA.

I believe that the time when *Icerya* was introduced into Cape Colony is not well known, but it existed there already in 1887.

Notwithstanding the fact that it had been fought there by an indigenous coccinellid (*Rodalia iceryae*) is still continued to spread and to attack quite extensively the citrus and other plants when the government of the colony applied first to Australia and then to New Zealand for specimens of *Novius*, but without success. It then asked the Department of Agriculture of the United States.

This had a number of them collected in 1891 and sent from California, but the *Novius* arrived at Cape Town all dead.

In the same year Thomas Louw came to the United States as member of the legislative assembly of Cape Town commissioned among other things to secure living specimens of *Novius*. He took three boxes containing *Novius* in various states of development, keeping one in the refrigerator and the others in his own cabin to be restocked with *Icerya*. He succeeded in bringing them to the Cape alive where they were favorably placed so as to protect them from inimical causes.

In 1892 Koebele, having returned to Australia in search of other parasites, sent another invoice of *Novius* to the Cape. The result in this country was identical with that in California.

ICERYA PURCHASI IN THE HAWAIIAN ISLANDS.

Icerya was introduced to the Hawaiian Islands in the vicinity of Honolulu in the spring or summer of 1889 probably with fruit from California and was observed for the first time in September of the same year. In April, 1890, its damage was noticed for the first time and then A. Jaeger wrote to California for *Novius* which were sent to Honolulu, where they arrived in good condition and multiplied so well that in November of the same year Jaeger was not able to find any *Icerya* to feed the *Novius* which he was raising in cages. In September, 1908, I also was able to ascertain that *Icerya* had become a real entomological rarity in the surroundings of Honolulu.

ICERYA PURCHASI IN FLORIDA.

In 1894 a nurseryman introduced *Icerya* from California to Florida and although he had brought *Novius* with it which he intended to acclimatize in the hope that it might be equally active

against other scalebugs and specially against *Aspidiotus*; as soon as its presence became known to the public and to entomologists these advised the complete destruction of the infested trees in order to eradicate the pest.

From 1894-1898 *Icerya* was not noticed any more, but in the last named year the locality in which it had first been imported and two other citrus orchards were found infested. Then the introduction and acclimatization of *Noxius* was decided upon and in 1900 all fear of *Icerya* had disappeared also in Florida.

ICERYA PURCHASI IN PORTUGAL.

It appears that *Icerya* was introduced in Portugal from the Azores, where for several years past it had been spreading probably brought there from North America. In 1897 several localities near Lisbon were found badly infested with *Icerya* and the attempt was made to fight this terrible scalebug with emulsions of sulphide of carbon, obtaining an appreciable result but really momentary. In the meantime Messrs. de Silva and Le Cocq decided to introduce *Noxius* and applied to Prof. L. O. Howard, successor to Riley as director of the Entomological Office of the United States Department of Agriculture. Howard with his proverbial kindness, known to all entomologists, had sufficient material of *Noxius* collected in California and sent to Lisbon in two invoices in October and November. Out of all the specimens sent only eleven arrived in Portugal alive, but from these such an abundance of offspring was obtained in a short time that in June of 1898 there were several thousands of individuals for distribution on the infected locality and during the remainder of that year *Icerya* was reduced also in Portugal to a negligible quantity.

ICERYA PURCHASI IN ITALY.

After Portugal it became the fate of Italy among other European nations to make the acquaintance of *Icerya*. It was exactly in May, 1900, in a garden at Portici, about 300 metres from the terrace of the entomological laboratory that the presence of *Icerya* was noticed by a proprietor, but not until November of the same year did it become known to Prof. Berlese, then director of the entomological laboratory. He and others maintain that it is not known where the infection at Portici came from, but it has been ascertained that, as the owner of the infected garden noticed *Icerya* in May, 1900, it must have been there since 1899.

During 1897 Prof. Berlese bred *Icerya* in a hothouse which had been secured for the purpose of study and this might lead to the assumption that perhaps the *Icerya* which developed in 1899-1900 in the garden at Portici came from some specimens which escaped in the larva state from the hothouse in 1897, hav-

g attached itself to some plant on the terrace or elsewhere and having had for some reason little offspring in 1898, and having made connection with a citrus plant in 1899 it had a chance to develop freely.

But fortunately at this time the results which had been obtained with the introduction of *Novius* in California and Portugal were well known; therefore Berlese wrote to entomologists of these countries and by their courtesy was able to secure living specimens of *Novius*, which arrived between April 11th and June 26th, 1901. The first ones were raised in appropriate cages and their descendants distributed for the first time on June 8th.

Other distributions were made in July. The result of this introduction of *Novius* was also surprisingly good because by the end of 1901 there were only traces of *Icerya* in evidence.

Afterwards *Icerya* spread everywhere in the surroundings of Portici, has been found at Nocera dei Pagani and as far as Canzanaro Lala in Calabria, but fortunately it is followed everywhere by *Novius Cardinalis* so that up to now it has always been kept down by it to a negligible number.

Let us hope that no inimical cause may come to us to make war on *Novius* and we shall have nothing to fear from *Icerya* which within a few years shall have spread all over those parts of Italy where citrus or other plants in which it delights are raised.

ICERYA PURCHASI IN SYRIA.

In a letter which Mr. Selvin Ali Slam wrote to the laboratory of entomology at Portici is stated that *Icerya* made its appearance in Syria about 1905 and in July, 1907, always according to Mr. Ali Slam, it had spread so much in the surroundings of Beyrut that it almost destroyed the trees.

He applied to this laboratory for specimens of *Novius* and I took it upon myself to send him a shipment in July and another in August. These multiplied there as well as they had elsewhere and Mr. Ali Slam expressed his thanks to the laboratory at Portici.

NOVIUS CARDINALIS AGAINST ICERYA AEGYPTIACA.

The news of the great result which had been attained with *Novius* in America in fighting *Icerya* having spread everywhere, was proposed in Egypt to try the introduction of the same *Novius* to fight another species of *Icerya*, *I. aegyptiaca* which did great damage there in the neighborhood of Alexandria, especially to citrus and fig trees.

Admiral Blomfield applied to Riley for living specimens of *Novius* and received several shipments in good condition. *Novius* in the presence of the new species of *Icerya* behaved the same as has done with *Icerya purchasi* and Blomfield could write to

Riley in 1893 announcing the acclimatization of *Novius* also in Egypt and informed him that they had already arrived three miles from the place where they had been distributed originally.

IMPORTANCE AND REASONS FOR THE SUCCESS OF THE INTRODUCTION OF *NOVIUS CARDINALIS*.

The success of the introduction of *Novius* as has been seen has been surprising in all the regions where it occurred as well in California as in Florida and the Hawaiian Islands, Cape Colony, Portugal, Italy, Syria, Egypt, and has saved many millions to these countries because without *Novius cardinalis* the raising of citrus fruit would have become impossible.

The reasons for this success beyond all expectation are due to three favorable circumstances which are: (1) *Novius* can produce in one year double the number of generations of *Icerya*. (2) *Novius* feeds with preference on eggs of *Icerya* when such are available. (3) The absence of insect parasites which in their turn attack *Novius* in countries where it has been imported.

Such an excellent result has as yet not been repeated by any other insect but other good results have already been obtained in other cases as will appear from all the attempts I shall record.

PARASITES OF *MAYETIOLA DESTRUCTOR*.

Riley in 1891 and 1894 imported from England to the United States a *Calcidid* (*Entedon epigonus*, Walker) parasite of *Mayetiola destructor*. In May, 1905, Ashmead found a male adult of this *Entedon* near Cecilton, Md., where the specimens from England had been distributed from which it may be considered as acclimated in North America.

PARASITE OF *LECANIUM OLEAE*.

The scalebug named after the olive *Lecanium oleae* but which in reality attacks many other plants, citrus among them, has become almost cosmopolitan. In the United States, as in other countries, where it was not attacked by other insects or by species of little activity, it caused severe damage, hence, when the success of *Novius* created such enthusiasm for entomophagous insects, the introduction to America of species which might attack efficiently this and other scalebugs was decided upon.

This time again the honor to visit New Zealand and Australia for collecting and sending to California entomophagous insects fell to Koebele and he knew how to fulfill this task most laudably.

Already during his first voyage in 1888-1889 Koebele had observed on the trees infested with *Lecanium oleae* a predaceous larva of a Lepidopteron (*Talpochara cocciphaga*, Meyr.) and had tried to introduce it to California, but the specimens he collected

died there before they could be favorably liberated. Other individuals he sent at the end of 1891 and still others he carried in the summer of 1892, leaving them at Haywards, California, but up to now nobody seems to have established the acclimatization of this species.

On the other hand Koebele was more fortunate with a Coccinellid, *Rhizobius ventralis*, Erich., which he found common in southern Australia and in Victoria living on various species of scale bugs among them of the genus *Lecanium*. Koebele sent many specimens to California in 1891-1892 where they became acclimated and spread over the whole state multiplying abundantly, especially in the coast districts, at the expense of *Lecanium oleae*.

The same *Rhizobius ventralis* was later brought to Hawaii where it attacks various species of *Lecanium* and in winter also *Pseudococcus nipae*, Mask., while in summer it retires to the hills.

Another Coccinella, *Orcus australasiae*, Boisd., was during the same time introduced from Australia to California by Koebele and although it lives on other scalebugs too, it has given in some parts of California good results also against *Lecanium oleae*.

Orcus chalybeus, Boisd., was sent by Koebele to California and became acclimated there, seemingly feeding rather more actively than the preceding species, attacking Diaspinae and young *Lecanium*.

The following Coccinellids (all described by Blackburn) were also sent there from Australia: *Rhizobius dorsalis*, *debilis*, *coecus* and *Cyrena nigellum*, *Scymnus flavifrons*, *sydneyensis*, *australsiae*, *greenlandicus*, but they seem not to have become acclimated.

Besides these predatory coleoptera, the work of an Hymenopteron was sought, *Scutellista cyanea*, Motsch., which in the larval state eats the eggs of *Lecanium* and also of *Ceroplastes*. Craw wrote to C. P. Lousbury, entomologist of Cape Colony, asking him to send specimens from that region. In October, 1901, a good number of them was sent to Craw in California; seventeen of them arrived alive and proved sufficient to obtain a first generation. The descendants of these were distributed in 1892 and from these specimens could be obtained for gradual distribution over the whole state where it is now splendidly established destroying a great number of *Lecanium* and *Ceroplastes* and seems to have there, in distinction from Italy, no parasites.

G. Gompere, another practical entomologist enthusiastic for the natural method introduced from Australia to California a chalcidid, *Hymencyrtus Crævi*, Ashm., endophagous parasite of *Lecanium oleae*. This hymenopteron seems to have established itself in some parts of California giving also its contribution to the destruction of the scalebug under discussion.

Lecanium oleae has in California another endophagous para-

site, *Tomocera californica*, How., which attacks it, besides a *Coccophagus* and several indigenous predatory *Coccinellids*.

Where these insects are at work *Lecanium* is now very well under control though it is still injurious here and there when it appears in a locality where there are no parasites for a longer or shorter time.

For fighting *Ceroplastes* in the eastern states Howard had also introduced *Scutellista cyanea* from Italy and it seems with success.

Scutellista was introduced by Craw also to the Hawaiian Islands in 1905 and there too it became so well established that I, desiring to collect near Honolulu *Lecanium oleae* parasitized by *Tomocera* to carry them to Italy, could not do so, because in a locality where a certain number of specimens of *Lecanium* had been found, which was in the hedge of Dr. R. C. L. Perkins' garden, all adult specimens instead of being parasitized by *Tomocera* had under their body the larva of *Scutellista*.

In Hawaii *Lecanium* is attacked by two other imported hymenoptera which are *Encyrtus fuscus* and a *Coccophagus*.

In Western Australia *Lecanium oleae* and *L. hesperidum* were widely spread causing noticeable damage to citrus and other trees, but in 1906 they were considered as being reduced to a negligible number by the work of eleven species of parasites imported by Comper from New South Wales, from California, from Brazil, from South Africa and China.

Of some of these parasites we know the specific names which are *Tomocera californica*, How., *Hymencyrtus crævi*, Ashm., *Myianeme Comperi*, Ashm., *Scutellista cyana*, Motsch., *Scutellista* sp. (red *Scutellista*).

I have imported from California to Italy several specimens of *Rhizobius ventralis* which I hope to be able to acclimatize and to add to the number of indigenous enemies of *Lecanium*.

PULVINARIA PSIDII AND DACTYLOPIUS. . .

During his voyage in 1891-92 Koebele observed a coccinellid, *Cryptolaemus Montrouzieri*, Muls., very active in fighting various species of *Dactylopius*, *Lecanium*, *Eriococcus*, *Rhizococcus* and therefore took care to send specimens to California wherefrom to obtain a good enemy against *Dactylopius*, which has really been achieved because *Cryptolaemus* is now common in southern California. In this same region Koebele introduced *Midus pygmaeus*, Blackb., predatory on *Dactylopius*.

Later he introduced *Cryptolaemus* also to Hawaii where it has resulted in the greatest advantage not inferior to that of *Noctus*. Before its introduction oranges and other plants (among them sugar cane and coffee) were much invaded by *Dactylopius* (*D. albizziae*) Mask., *calceolariae*, Mask., *citri*, Risso, *filamentosus*, Cock., *bromeliac*, Bouch., *virgatus*, Cock., while now they are al-

most free, as I myself could observe. From China and Japan Koebele introduced to Hawaii another coccinellid (*Sticolotis punctata*) predatory on *Dactylopius*. In Hawaii there is now *Pseudococcus* (*Dactylopius*) *nipae*, Mask., widely distributed on various plants, because it is only seldom attacked by *Cryptolaemus* and only in winter by *Rhizobius ventralis*.

Several parasites collected by Koebele in Mexico seem not to have become acclimated.

In Mexico, near Jalapa, I too have seen *Pseudococcus nipae* actively attacked by *Hyperaspis sylvestrii*, Weise., and by a fungus and it is necessary now that these enemies *should be introduced to Hawaii*.

Pulvinaria psidii has been very harmful in Hawaii, since Koebele after a visit to the coffee plantations in 1894, wrote that he had never seen trees blackened so much by smut, which had developed on the sugary excreta secreted by *Pulvinaria*, while three years later he found the same locality almost freed by *Cryptolaemus* which had attacked *Pulvinaria*, destroying its eggs. Also the chalcidids, *Microterys flavus*, How., and another not determined species, destroy this *Pulvinaria*.

Pulvinaria mammeae is also attacked in Hawaii by *Cryptolaemus* by *Noctius cardinalis* and by *Hyperaspis*.

Finally *Cryptolaemus* has proved a most efficacious predator and, in Hawaii, as useful (if not, as some say, more so) than *Noctius cardinalis*.

I have taken living *Cryptolaemus* from Hawaii and from California and have distributed them at Capri, Ischia, Palermo, Portici, in citrus orchards infected by *Dactylopius citri* which, although it has a number of parasites in our country, frequently becomes very harmful.

CEROPLASTES RUBENS, MASK.

This species of Asiatic origin was up to about 1895 very common in Hawaii, but Koebele succeeded in finding in China and sending to Honolulu various hymenopterous parasites of which at least four have become acclimated.

In 1900 *Ceroplastes rubens* had become rare. Among the most efficacious hymenoptera there we have to add *Tomocera ceroplastis* and an *Encirtid*.

DIASPINAE.

The numerous scalebugs of this group are very harmful and are amongst the most difficult to fight with natural means, in fact while against *Icerya*, *Lecanti* and *Dactylopiini* very good or good results have been obtained, against *Diaspini* the results have been only partial, so that in California, at least, for the present, agriculturists prefer to fight the scalebugs with cyanide acid fumiga-

tions, which cost 40 to 50 cents per tree, rather than await the work of predators and endophagi, indigenous and imported. I shall record the principal attempts and the results obtained.

Koebele and later Compere on all their voyages collected insect enemies of Diaspinae and sent them to California and to Hawaii.

To the first named region he has sent since 1891-92 the following Coccinellids: *Orchus chalybeus*, Boisd., observed in Australia, a good predator of *Aonidiella aurantii* (Mask.), *Planchnia*, *Phaenacaspis eugeniae* (Mask.), *Eriococcus* sp. In September, 1892, it had already multiplied at Los Angeles, California, to such an extent that Koebele calculated his specimens not less than 5,000. Afterwards it was distributed in many parts of California, where it lives at the expense of the above named scale and also of *Aonidiella aurantii citrina*, Coquil., and some other Diaspinae. *Orcus Australasiae*, predator of *Lecanium* and also of *Aspidiotus perniciosus* as has been observed near Alameda is not common in California, while *Rhizobius lophantae*, Blaisd., (*R. toozeoombae*) is abundant. Also this Coccinellid was introduced in California from Australia by Koebele in 1891 and has greatly multiplied splendidly, so much so as to become common and useful in the destruction of the two species of scalebugs mentioned and the following: *Aspidiotus perniciosus*, *hederac*, *Lepidosaphes citricola*.

Of this *Rhizobius* I have imported a good number of specimens which have been distributed at Capri, Ischia, Portici, Palermo, Lonato (Brescia).

Rhizobius debilis, Blackb., has become acclimated in California and pretty well spread preying on *Lecanium oleae*, *Aspidiotus perniciosus*.

Rhizobius satellus, Blackb., has been sent to California in large quantity but seems not to have become acclimated, the same may be said of *Rhizobius speculifer*, Blackb., *R. aurantii*, Blackb., *R. hirtellus*, Blackb., *Lipernes subviridis*, Blackb., *Serangium hirtuosum*, Blackb., *S. maculigerum*, Blackb., *Trithionyx lanosus*, Blackb., *Scymnus flavifrons*, Blackb., *S. sydneyensis*, Blackb., *S. achittonensis*, Blackb., *L. Queenslandicus*, Blackb., *S. australasiae*, Blackb., and also a larva of Tineide.

In the Hawaiian Islands Koebele introduced for the fight against Diaspinae the two species of *Orcus* mentioned, of which *Orcus chalybocus* is sufficiently common on citrus trees, as I have had occasion to see, *Rhizobius lophantae* which often develops in good numbers at the expense of *Phaenacaspis eugeniae* (Mask.) and later on (1896) from China *Chilocorus circumdatus*, Schon., and *Platynaspis* (*Pentilia*) *nigra*, Weis., which attack specially *Lepidosaphes citricola*, besides some other Diaspine.

Many other coccinellidae to fight Diaspine have been sent to Hawaii from Australia and China, but they have not become acclimated and have not yet been observed. From the first named country *Serangium maculigerum* has become acclimated with cer-

tainty, as I have been told by Dr. Perkins, who observed it in a mountainous country but without having had occasion to ascertain its victims.

The same Koebele, very likely, but Craw with certainty, introduced (1905) from Japan also *Chilocorus similis*, Rossi. He raised it in a cage, but nobody seems to have observed it recently at liberty.

Also many Hymenoptera endophagi of Diaspini have been introduced in Hawaii by Koebele from Australia and China, but reliable data about them are up to date not available.

In the Hawaiian Islands, where the result of such introduction can be much easier noticed than in California, it may be said that the Diaspinae are attacked by all the predators and endophagi in such a manner that citrus and other plants are generally only to a small degree infested by them. But in some localities I saw trunks of citrus trees almost completely covered by *Lepidosaphes*, though larvae and adults of *Chilocorus circumdatus* were already preying upon them. I also saw in abundance *Phenacaspis eugeniae* on *Nerium oleander* and without predatory or endophagous insects.*

It must be recognized, however, that if the result of fighting Diaspinae has not been the best even in the Hawaiian Islands since trees which are badly infected by them are still to be seen, nevertheless it is pretty good, as most the time there is no absolute necessity for fighting artificially any species of these scalebugs, which number about thirty or more.

In West Australia Compere has introduced from China *Hymenopterous* parasites of *Aonidiella aurantii* and *Lepidosaphes citricola* and has succeeded to acclimatize them there. I do not know whether the North American *Chilocorus bifulnerus* which he introduced in Australia to fight the Diaspinae there is acclimated.

In regard to Diaspinae I will give further particulars on the attempt of natural control made by the Division of Entomology of the United States Department of Agriculture, against *Aspidiotus perniciosus* and the one initiated in our country against *Diaspis pentagona*, Targ.

Aspidiotus perniciosus is a scalebug considered rightly in North America as the one most to be feared, being able to kill fruit trees in two or three years if not efficiently fought.

This pest made its appearance in California (San Jose) about 1870 and has now spread over almost all the states, where it attacks considerably more than seventy species of plants and almost as many more accidentally, which is explained by its easy propagation.

The North American entomologists always hoped to find in entomophagous insects the most efficacious means of control.

* Both *Aphelinus* and *Chilocorus circumdatus* I observed attacking this Diaspine.—J. K.

hence Koebele already on his first voyage to Australia (1888-89) collected predators of Diaspinae, having succeeded since then in sending to California and in acclimatizing *Rhizobius lophantæ* (Blaisd.). On his other trips Koebele sent all the other predators of Diaspinae, enumerated above, but among so many species only a few became acclimated in California (*Orcus chalybæus*, *Australasiae*, *Rhizobius debilis*, *ventralis*) and they did not yield very good results, adding only to the indigenous predators and to various endophagi. Of these there are, according to Howard, eight species of the genera *Aphelinus*, *Aspidiotiphagus*, *Anaphes*, *Phycus*, *Prospaltella*, *Ablerus*, *Rhopoideus*, but none of them peculiar to *Asp. perniciosus*. In California, where the climate is very dry, they generally succeeded in keeping down *Aspidiotus* to an almost negligible number.

In the eastern states, on the other hand, where *A. perniciosus* continued very harmful notwithstanding the presence of most of the mentioned endophagi, and of the several predators, the most active among them *Chilocorus bitulcerus*, Muls., and *Microgaster* (*Pentilia*) *misella*, Prof. L. O. Howard sent C. L. Marlatt in 1901-02 on a voyage to China and Japan, in order to solve the still very uncertain question of the original home of this *Aspidiotus* and to collect the possible natural enemies in that region.

As a result of this entomological exploration it was believed possible to establish the fact that *Aspidiotus perniciosus* is a native of China where its principle enemy capable of checking its excessive development, according to Marlatt, is *Chilocorus similis*, Rossi. Marlatt sent many specimens of this species to Washington, but only two survived, which were raised in cages and furnished in 1902 abundant offspring which were distributed in various regions of the eastern states to the north and south of Washington.

The colonies in the north did not give any good results while the south, specially those of Georgia, they multiplied rapidly in 1903-1904. Notwithstanding this, here also *Chilocorus* diminished greatly on account of the universal use against *Aspidiotus* of a cheap and very efficacious artificial remedy and when in October of this year I tried to get some living specimens to take to Italy, Prof. L. O. Howard with his proverbial kindness asked the entomologist of Georgia to collect and send to Washington alive a number of *Chilocorus similis*, but he replied that he had found it impossible to find any. With the artificial remedy which hindered the propagation of *Chilocorus similis* there has been combined in North America the work of an endophagous hymenopterous parasite, which decimated in Washington the specimens which had been set at liberty and had multiplied in the beginning.

And so, up to now at least, the introduction of *Chilocorus similis* has not given any satisfactory results and probably will not do so in the future on account of the presence of an active parasite.

The fruit growers of the east are now obliged to continue the artificial method in order to save their plants.

But in Florida and in other parts of the south, where the climate is warm and moist *Aspidiotus perniciosus* has found an efficacious enemy in a fungus, *Sphaerostilba coccophila*, which has been introduced by Koebele to Hawaii also.

DISAPIS PENTAGONA, TARG.

The scalebug of the mulberry tree is probably a native of China and Japan, but has been imported besides Italy into North America, Australia and other countries, causing damage everywhere but nowhere so serious and as continuous as in our country. The artificial fight and the law which compels it is well known to all in Italy, while the results are hardly worth mentioning notwithstanding the expense involved. At least since 1904, when through a publication of Sasaki it became known that it had predatory and endophagous parasites in Japan, their introduction should have been attempted in Italy. Instead it was 1902 before Berlese pointed out a natural method of control against Diaspis and having learned in 1905 from Howard that there existed in North America endophagous parasites of *Diaspis pentagona*, he asked him to send him infested *Diaspis*. From those which were kindly sent to him, he obtained a species of hymenopteron, which Howard recognized as new and named it *Prospaltella Berlesei*. The laboratory at Portici, direction of which I had in 1904, began in the same year to write to Japan for vegetable and animal parasites, and in 1905 to North America where *Chilocorus similis* had been introduced, but not till 1907 could I obtain, through the kindness of Prof. L. O. Howard, many *Diaspis* parasitized by *Prospaltella*, which were taken to Acerra (Caserta), Grottamare (Ascoli Piceno) and to Palombina near Ancona.

This parasite has become acclimated in the above named and other places of northern Italy and at Pisa where it has been introduced by the entomological station at Florence, but so far we cannot speak about its value in the fight against *Diaspis*, because we do not know well the biology of *Prospaltella*.

In October, 1908, I imported from North America the two Coccinellids, *Rhizobius lophantæ* (of Australian origin) and *Chilocorus bivulnerus*, good predators of *Diaspis*. During the current year it will be seen whether they have become accilimated and what contribution they can make to the destruction of the mulberry tree scale.

If these enemies will not succeed in fighting *Diaspis* it will be necessary to introduce still other species of Hymenoptera and coccinellids which exist specially in China and Japan and also elsewhere. Prof. L. O. Howard informed me that in 1895 he obtained a species of parasite from *Diaspis pentagona* received from

Cape Colony and that in the same year he obtained a *Diaspis pentagona* which lived on trees in the Department of Agriculture grounds in Washington; that in 1896 he identified as *Aspidioli-phagus citrinis* specimens of parasites obtained by Cockerell from *Diaspis pentagona* from Ceylon and of Cape Colony; that in 1897 he obtained a species of parasite of the same scalebug received from Wooster, Ohio, and in 1898 other specimens (from the same locality) which he recognized this time as *Archenomus bicolor*, How. In 1898 he obtained another species of parasite from specimens of *Diaspis pentagona* received from Fritz Noack of Campinas (Brazil), and in 1899 he obtained also three species of parasites of the same scale gathered in Porto Rico by Mr. August Busck.

I am now getting material from all the regions where parasites of *Diaspis pentagona* have been found, but I believe it would be also well to send an entomologist specially to China and Japan to study there all the natural enemies of *Diaspis* to make a rich collection and repeated shipments until their acclimatization shall have been assured. Such a trip to China would be also opportune for studying the parasites of *Aonidiella aurantii*, *Lepidosaphes citricola* and *Parlatoria sisyphi*, which are scalebugs very harmful to citrus trees and which have no parasite in our country, while it is known for certain through the researches of Compere and Muir that they have such in that country.

To fight *Diaspis* the introduction of all kinds of endophagous and predatory parasites and also of other Diaspinae from any country should be tried. Only in the natural fight is there likely to be found a certain and really useful method of fighting this scale which threatens one of our most flourishing industries.

Government and private citizens should vie with each other to follow the way to a possible natural fight and lose every hope only after everything that modern entomology can do has been tried.

APHIDAE.

Koebele on the first trip to New Zealand and Australia collected in the first named region about fifty specimens of *Coccinella nova zealandica* predatory on *Aphis brassicae* and took them to California, succeeding in liberating twenty-one near Alameda. On his second trip he sent the following species to California: *Coccinella arcuata*, Fabr., (for the Aphids of Citrus trees), *Leis conformis*, Boid., for various Aphids and specially for *Schizoneura lanigera*, *Coccinella Kingi*, MacLeay, for aphids of citrus trees; *Coelophora inaequatis*, F., (= *Coc. repanda*, Koebele) for various aphids; *Meda testurinaris*, Muls., for aphids of citrus trees; *Verania frenata*, for various aphids; *Scymnus notescens*, Blackb., for the aphids of citrus trees. But of these species not one seems

to have become acclimated in California, at least so far as I know data in regard to them are up to now not available.

In Hawaii on the other hand *Coelophora inaequalis* also introduced by Koebele has given excellent results. It has propagated there rapidly, and wherever aphids appear, it does its beneficial work. I have been able to see for myself in a garden a small bed of beans infected by *Aphis papaveris* with numerous individuals of that species, *Platyomus lividigaster*, and some *Scymnus notescens*, all intent upon the work of destruction. Dr. Perkins told me that of all the coccinellids introduced, he believes that in the Hawaiian Islands those which proved most useful were *inaequalis* and *Cryptolaemus montrouzieri*.

Inaequalis eats many species of aphids and also young larvae of *Perkinsiella saccharicida*, Kirkl. *Platyomus lividigaster* is more common now in Hawaii than in Australia, its original home.

More recently Koebele introduced also *Coelophora pupillata*, Schoen., which has become acclimated there, feeding on Aphids and Aleurodes.

Of *Verania frenata* and *V. lineola*, also introduced in Hawaii, no specimens have been observed at liberty.

In 1905 Craw introduced from California *Hippodamia ambigua*, *H. convergens*, *Coccinella californica*, but no news of their acclimatization has been heard. While American entomologists made efforts to obtain insect parasites from Australia, they sent on their part, with their well known generosity, American species to New Zealand, among them *Cycloneda sanguinea* and *Hippodamia convergens* to fight *Schizoneura lanigera*, but the results of this introduction are not known.

Compere has introduced in West Australia several species of aphids, eaters, one of which seems to have succeeded very well in fighting *Aphis brassicae*, L.

I have tried repeatedly to introduce *Platyomus* and *Coelophora* from Hawaii, but unfortunately I have not succeeded so far because the specimens arrived always dead.

ALEURODIDAE.

One species of Aleurodes was very common in Hawaii on coffee plants and very harmful, but has now become so scarce that Kotinsky in 1907 could not find specimens for description. This extraordinary diminution is attributed to various parasites introduced by Koebele, but their names are not known.

PERKINSIELLA SACCHARICIDA, KIRKL.

We have seen what excellent results in fighting *Icerya* have been obtained everywhere, with the introduction of *Noctius cardinalis*, how efficacious has proved *Cryptolaemus montrouzieri*, especially in the Hawaiian Islands in checking the development of

various species of *Dactylopiids*, not to speak of how useful proved also in the Hawaiian Islands the introduction of *Coelophora inaequalis* in destroying the numerous aphids which destroyed many plants.

Such examples are certainly fine, demonstrative, but also appear simple and their solution could not require very special ability once the principle was recognized of the possibility of finding useful parasites against harmful insects, as for instance *Icerya* in their home country.

In the case of *Cryptolaemus*, *Coelophora*, and *Platyomus* Koebele demonstrated also how it is possible to fight with insects parasitic of species of a certain region insects of related species or of other genera native of other countries, and therewith instituted another noteworthy step in the natural method of control, but still he had to prove to the world how much confidence has to be placed in the auxiliaries offered by nature.

In this new case he needed the efficient assistance of a profound connoisseur of insects of every group, of a diligent and patient collector, observer and breeder, that is of Dr. C. L. Perkins, as well as an able systematician of Hemiptera, Kirkaldy.

The occasion for this new and great experiment, which to relate gives me great pleasure, was offered by *Perkinsiella saccharicida*, Kirk., Hemipteron of the family Asiracidae (Fulgoroidea).

This *Perkinsiella* is a small insect four to six millimetres long. It deposits its eggs in or near the mid rib of the leaf and also on the stem of sugar cane. The larvae and adult live on the juice of the cane. The damage it does is direct and indirect; the first is caused by the deposition of the eggs and the subsequent openings of the larva which has to work its way through the epidermis, and by the abstraction of nutritive liquids caused by the larvae and the adult. The indirect damage is due to the smut and other fungi which develop on the cane plants in excrementa of *Perkinsiella*, which contain sugary substances.

In the case of serious infection if the cane plants are small they may be completely destroyed, if they are well enough advanced they lose many leaves, do not reach complete development, and yield a crop smaller of course in proportion as the damage is greater.

Perkinsiella saccharicida was seen for the first time by Perkins who collected several specimens, but not until the end of the year 1901 or the beginning of 1902 was it found harmful to sugar cane on the islands of Oahu and Kauai. In the month of November, 1902, Perkins wrote: "This little insect is very injurious to sugar cane and its destructive activity threatens to surpass that of the insect which bores galleries in the cane (*Sphaenophorus*)."

The subsequent events happened briefly as follows: On all the sugar plantations *Perkinsiella* spread rapidly causing such enormous damage that Van Dine calculated it in 1903 to amount to \$3,000,000. Rightly alarmed the sugar planters pressed the

entomologists of the Territorial government to find a way of fighting this fearful pest, which had it continued would have compelled them to relinquish the most remunerative industry of the islands.

Fortunately Koebele and also Perkins were there, both enthusiastic for the natural method of control and the only one they could consider in the present case.

Koebele having heard from Prof. L. O. Howard of the presence of parasites of Fulgoridae in Ohio went there in 1903 collecting many species, of which he succeeded in raising in cages, using *Perkinsiella* as host, two Hymenoptera of the family Dryinidae (*Hoplogonatopus mexicanus* and *Pseudogonatopus*, sp.).

These were liberated in the cane fields but no specimens were observed subsequently.

In the meantime Perkins sought to ascertain the original home of *Perkinsiella*, convinced that it was a recent introduction. At first he suspected that it was a species existing in Java (*Dicranotropis vastatrix*), but, with the help of Kirkaldy who could obtain specimens of that species, he established the fact that such was not the case. He repeatedly applied to his correspondents in Australia and finally, about the beginning of 1903, he received from Queensland several specimens of a Hemipteron which lived there on sugar cane, and which were exactly identical with those of the Hawaiian Islands.

Having therefore ascertained that *Perkinsiella saccharicida* was of Australian origin, the Sugar Planters' Association did not hesitate to accept the proposition to send to Australia in search of parasites of *Perkinsiella* and entrusted this task to Perkins and Koebele.

They arrived in Australia in May, 1904, and Perkins returned to Honolulu about the end of the same year after having visited together several parts of Queensland where they made very rich collections. Koebele went for another short time to the Fiji Islands in order to continue the collection, specially of Fulgoridae and their parasites.

Perkins and Koebele gave themselves entirely to the collections of *Cicadoidea* and *Fulgoridea* and their parasites, of all the species they could find, sending the largest possible number of specimens alive to Honolulu, where Craw took most diligent care of them.

They collected more than one hundred species of parasites, of which the following became acclimated in Hawaii: *Anagrus* (two species or two races of the same species), *Paranagrus* (two species, *P. optabilis* and *P. perforator*), *Ootetrastichus beatus*. These species are all of prime importance because they are parasitic on the eggs of *Perkinsiella* and show their activity also in quite distinct parts of the leaf, thus *Paranagrus* prefers to parasitise the eggs deposited in the mid rib at the base of the leaf, *Ootetrastichus* also those of the mid rib but in the high part of the leaf, and *Anagrus* the eggs in the leaf proper adjacent to the mid

rib. These parasites have multiplied rapidly, but *Paranagrus* and *Ootetrastichus* are more common, because *Anagrus* parasitizes the eggs of other Fulgorids besides *Perkinsiella*.

From only four individuals of *Paranagrus* arrived alive at the end of January, 1904, at Honolulu, a very large number was obtained for delivery one year later on many plantations.

According to observations by Dr. Perkins about the end of 1906 from leaves with eggs of *Perkinsiella* which had been collected on a plantation, which before had suffered great damage, 3,275 parasites and 250 larvae of *Perkinsiella* were obtained in the laboratory which means that 86.3% of the eggs had been destroyed.

Otto H. Swezey in a report of a visit to a plantation on the Island of Hawaii on April 10, 1906, wrote: "This pest(referring to *Perkinsiella*) has begun to become very much reduced in comparison with the last visit in December, 1905, but is still causing here and there serious damage. The egg-parasites are multiplying more and more and are distributed over the whole field wherever there are *Perkinsiella*."

One year later the same entomologist having visited the same plantation reported that *Perkinsiella* was almost entirely destroyed and that the parasites were as few as the hosts, but that they were to be found wherever there was *Perkinsiella* left.

Besides these species of egg parasites the following now attack *Perkinsiella*: *Haplagonatopus critiensis*, collected by Muir in 1907 on the Fiji Islands; a *Pseudogonatopus* sp. sent by the same from China, and another *Pseudogonatopus* sp. which Koebele (1908) obtained in Mexico from a species of the genus *Liburnia* and which has adapted itself in Hawaii to parasitise *Perkinsiella*. Also species of *Dryinidae*, native of Kauai and Oahu, *Echthrodelphax fairchildii*, P., and formerly parasite of other Fulgorida, has adapted itself to *Perkinsiella* and has been distributed on all the other islands of the group. Of the predatory Coleoptera: *Verania frenata* and *V. lincola*, *Callineda testudinaria*, raised excellently in cages and distributed in large numbers, nothing certain can be said and the same applies to the numerous other parasites which arrived alive at Honolulu and which were collected in part on another voyage on which the Sugar Planters' Association had sent the Assistant Entomologist Muir to the Fiji Islands in 1906 and later on to China.

The practical result of the introduction and acclimatization of the imported parasites has been so good that all anxiety on account of *Perkinsiella* seems now dispelled and so it appeared also to me, having seen a number of parasites hatch from the eggs of leaves from different localities.

Only the practice of burning the cane leaves in the fields kills many parasites while the *Perkinsiella*, being able to fly, can save themselves easier and this hinders their reduction to a smaller number, but already entomologists are studying to find a way to

obviate this loss of help. Koebele and Perkins, as well as the Sugar Planters' Association, who largely furnished the means may be well satisfied with the results obtained.

From a scientific point of view the results have been very good. It is a matter of hundreds of descriptions of new *Hymenopterous* parasites together with their hosts also largely new, and with the biological observations there will be added an excellent contribution to the knowledge of the families of *Diptera* (*Pipunculidae*), *Coleoptera* (*Stylopidae*), which are little known and there will become known a new family of *Lepidoptera* (*Epipyropidae*) of singular structure and habits all in all our knowledge of Australian *Cicadidae* and *Fulgoridae* and their parasites will be greatly enriched.

The major portion of the work on these insects has been written by Perkins and Kirkaldy and a smaller part by Terry, Swezey and Muir, who are entomologists of the Sugar Planters' Association laboratory; complete they form two volumes which I consider among the most important publications in our time on a subject of agricultural entomology, though it may now perhaps be equalled or even considerably surpassed by what is being achieved in the United States in regard to *Lymantria dispar*, L., and *Euproctis chrysorrhoea*, L., under the direction of Prof. L. O. Howard.

LEPIDOPTERA.

I have already mentioned that about the end of 1883 Riley introduced in the United States from England *Apanteles glomeratus* which became acclimated and spread rapidly.

OMIODES ACCEPTA (BUTL.).

This is a species of butterfly of the family Puralidae, native of the Hawaiian Islands, which in the larva state injures the sugar cane folding the edges of the leaf against each other and eating parts of it. The harm done by it may at times become quite serious.

This Lepidopteron had been attacked by several species of indigenous parasites but Koebele introduced several others besides, of which *Macrodyctium omiodivorum* Terry is the most important, having destroyed alone as much as 75% of larvae in one locality. The year of introduction and origin of this species are not known with certainty. *Chalcis obscurata* Walk. has been introduced in 1895 from Japan and in 1896 from China and spread rapidly in the Hawaiian Islands parasitising besides Omiodes other Lepidopterous chrysalides (*Phlyctaenia*, *Casoecia*, *Plusia*, *Tortrix*): *Trichogramma pretiosa* Riley, a North American species, was also introduced perhaps about 1898 by Koebele and is now well spread destroying eggs of various species of Lepidoptera including those of Omiodes.

With this experiment has been demonstrated for Lepidoptera as had been for Hemiptera, that it is possible to acclimatize and adapt in a certain country species of foreign parasites which in their original home parasitise other species, even of different families.

CARPOCAPSA POMONELLA (L.).

Carpocapsa pomonella or Apple worm, a species believed to be of European origin, and well known for the common damage it does to apples, pears and other fruit, was introduced during the last century in North America, in Australia (1855), Tasmania (1861), New Zealand (1874), South Africa (1887), Brazil (1891) and it may be said that it arrived in the space of few years wherever apples are raised. In Europe it is attacked by several species of insects which destroy it in its various states, therefore its damage is not of the same severity every year: outside of Europe it has been attacked gradually by several parasites of these countries and since the first years of its introduction its damage has somewhat diminished still remaining always serious or very serious. In the United States for instance the annual loss is calculated at 30-75% in many parts of the West. In the face of such great loss, which in 1902 amounted to more than \$11,000,000 to the United States, entomologists have sought to fight this plague artificially and have succeeded.....with lead arsenate, but as this method involves considerable expense, they considered also the introduction of parasites from Europe.

California entrusted Compere with the search for parasites of *Carpocapsa* in Europe, and in 1903 he succeeded in sending specimens of a species, *Ephialtes messor* Gravenh., collected in Spain. Much hope was placed on this species which became easily acclimated, but in reality the result up to now has been almost nil, and it may be said in regard to *Carpocapsa* that much remains still to be done as far as a natural fight is concerned outside of Europe by introducing the parasites which attack it in the latter region.

Riley sent specimens of a species of *Raphidia* (Neuroptera) from California to New Zealand in 1890 and to Australia in 1891 to fight *Carpocapsa* there, but the introduction of this insect did not result, as it seems, in any benefit.

LYMANTRIA DISPAR (L.) AND EUPROCTIS CHRYSORRHOEA (L.).

These two species of Lepidoptera are natives of the temperate zone of the old continent including Japan and live on the leaves of many species of the forest and fruit trees. In the old continent they are attacked by numerous enemies therefor their damage is fortunately not continuous, but periodical, not so in the United States where they were introduced.

Lymantria was imported to Medford, Mass., in 1868 by Prof. Leopold Trouvelot for the purpose of study. A few specimens escaped from the Professor and once at liberty they became acclimated and multiplied in that locality. In 1890 the presence of Lymantria began to impress the population of the infected zone which comprised by that time twenty towns, then the Bureau of Agriculture of Massachusetts undertook the suppression of this insect and spent from 1890 to 1899 large sums in this work, about \$1,200,000, succeeding in reducing Lymantria to a minimum but certainly not in exterminating, this being impossible. After such result, in 1900, the agricultural office of the state thought it timely to strike from its expense account the sum appropriated for the fight against Lymantria, leaving to private individuals and to city administrations the care of continuing the fight. But from 1900 to 1904 Lymantria again developed and to an alarming degree and then the government of Massachusetts founded a laboratory for the fight against this insect entrusting the direction to A. H. Kirkland and endowing it with \$150,000 per year which in 1906 was raised to \$225,000.

The area in Massachusetts occupied in 1899 by Lymantria had extended in 1905 fourfold and spread also to the following States: Rhode Island, Maine, Connecticut, New Hampshire. In this State the government appropriated in 1906 the sum of \$83,500 and in the two following years \$25,000.

Euproctis was introduced at Sommerville, also in Massachusetts with some small plants in 1890, but not till 1897 was a beginning made to fight it together with Lymantria. In 1899 it was discovered also in New Hampshire.

As may be seen, the two most destructive Lepidoptera have already widely spread notwithstanding the efforts of the North Americans and will without doubt and in spite of the incessant artificial fight which is now everywhere waged against them, it being inaugurated in all the different States, continue to spread and to seriously menace tree cultivation in North America if nature does not step in with its powerful means to check its development. Fortunately a bacterial malady had been observed among the larvae of these lepidoptera also in North America, some local insect parasite has begun to adapt itself destroying a small number, but all that is still little.

In 1891 at a conference held in Boston, about the best method to destroy Lymantria Prof. Riley, besides recommending the various methods of artificial fight, suggested to send one or two persons to several European countries to collect and send to America primary parasites of this species. But this proposition was not accepted, which was a great mistake, because had it been followed, perhaps by this time *L. dispar* and *Euproctis* would have been conquered in the United States even more thoroughly than in Europe, by their parasite.

Taking up again the fight against these insects, Prof. Howard

in 1904 again very properly proposed the natural as the best means to be tried, and his proposition carried. The Federal government appropriated \$6,000 for this work and the State of Massachusetts \$30,000 for three years, while for 1908 Kirkland asked \$15,000 additional for this work.

Prof. Howard during three succeeding years, 1905-1907, went to Europe and visited France, Belgium, Germany, Switzerland, Italy, Austria and Russia to find voluntary or paid correspondents who would undertake to send to Boston eggs, larvae and chrysalids of the two Lepidoptera under discussion. He also sent Prof. Kincaid every year since 1906 to Japan to collect there and send to Boston the same material. In the meantime there was organized near Boston a laboratory with a well fitted personnel and a full equipment of cages of the largest dimension capable of holding trees four to five meters high, and small ones for the laboratory, in order to dispose of all that would be sent by correspondents and each order of parasites was entrusted to the special care of an assistant helped by another person in case of need.

The result of the travels of Prof. L. O. Howard was the sending every year, from all the countries visited of large quantities of packages containing eggs, larva and chrysalids of *Lymantria* and *Euproctis*. In 1908, in order to shorten the voyage from Europe to Boston, all material collected in Europe was sent to Rennes in France from there directly to Havre and thence to Boston.

From Japan Prof. Kincaid sent also large quantities of material.

On arrival in Boston the packages are taken to the laboratory, without having to pass the customs inspector, this having been arranged by the government, and there opened in a completely enclosed space to prevent the escape of possible secondary parasites. The material is then placed in cages or boxes for developing the insects. These cages are provided in front with many openings in which glass vials are fitted so that the parasites hatched in these boxes enter the tubes, attracted by the light, and may so be easily observed and liberated in other boxes prepared for rearing primary parasites or be destroyed.

When in July, 1908, I visited the laboratory I observed with the greatest interest all the particular methods followed in the breeding among which at that time that of *Calosoma sycophanta* was in full progress. I also saw many other parasites, Hymenoptera and Diptera, which had been obtained from European and Japanese material.

According to a table already published by Howard, the species of parasites introduced in America up to 1908 were fifty-seven, five of which were Coleoptera, twenty-three Hymenoptera and twenty-nine Diptera.

How many of them have been acclimated is not yet known with certainty except three species: *Calosoma sycophanta*, *Apanteles* and *Pteromalus*; but it is very likely that the same is true of several others.

From Dipterous parasites of the family *Tachinidae* many rearings were made and very singular habits observed by Townsend; it may be affirmed that at least several species have become acclimatized.

The practical results of this grand experiment with the natural method of struggle undertaken by the American entomologists is not yet evident and cannot become so for several years to come, but if nature conceals no new weapons of offense and defense against which man would have to declare himself really powerless, the result, I repeat, of this grand experiment cannot be but the best. The introduction of so many parasites of *Lymantria* and of *Euproctis* will have saved North American arboriculture, will have saved enormous wealth to all humanity.

COLEOPTERA: DENDROCTONUS FRONTALIS, ZIMM.

This *Scolytid* was very injurious in 1889-1892 in North America and especially in West Virginia. It is indigenous of those regions and is fought there by various enemies, but Hopkins, then entomologist of West Virginia, having learned, that in Europe another Coleopteron, *Clerus formicarius* L. was a very active enemy in fighting the *Scolytids*, intended to try its introduction to America. Having obtained the necessary means, he went to Germany in 1892 where he collected more than a thousand specimens of *Clerus*, which he took with him to the United States and distributed in various localities infested by *Dendroctonus*. In the year following this insect disappeared almost entirely from other causes; of *C. formicarius* nothing more has been heard subsequently, and thus this experiment seems to have been a complete failure.

GALERUCELLA LUTEOLA MULL.

This Coleopteron, which eats the leaves of the elm tree, seems to have been imported from Europe to America about 1837 in the neighborhood of Baltimore; since then it has spread in the East from Boston to North Carolina, has crossed the chain of the Alleghany mountains and continues spreading westward. Not having any special enemies to attack it in North America, except in some years the atmospheric condition and perhaps some bacterial malady, its damage has been almost continuous in the regions it occupies, damage easily noticed, consisting in first skeletonizing the leaves of the elm tree and then its complete defoliation.

North Americans being perhaps more fond of trees than any other people, they plant them wherever possible, even in cities along the streets, besides the numerous parks, and have always sought to fight *Galerucella* by spraying with arsenical insecticides at no small cost.

But for several years Prof. L. O. Howard had in mind to intro-

duce in the United States the parasites of *Galerucella*, at least four of which exist in Europe, and specially the egg parasite, *Tetrastichus xanthomelanae* (Rond.), the biology of which Prof. Marchel had studied in 1905.

In 1908 Prof. L. O. Howard received about a hundred living specimens of this parasite and had the eggs of *Galerucella* infested by them.

In the same year their acclimatization and multiplication became noticeable around Boston and colonies could be sent to various other States.

If as is probable the adults of *Tetrastichus* born from the last eggs of *Galerucella* should pass the winter and part of spring in good condition, there will be a great multiplication of them this year so as to have individuals to distribute in all the regions infected by *Galerucella* and within a few years their effect will be evident by having rendered inconsiderable the existence of another insect which now inflicts great damage to a plant mainly used for ornament.

SPHENOPHORUS OBSCURUS.

The larva of this Coleopteron, which was noticed for the first time in the Hawaiian Islands in 1865, bores galleries in the stalk of the sugar cane inflicting pretty serious injury.

In 1904 the damage caused by this insect in the Hawaiian Islands was calculated to about \$500,000. It also attacks bananas (*Musa* sp.), two species of palms (*Caryote urens* and *Oreodoxa regia*) besides the coco palm and the papaya (*Carica papaya*).

The Hawaiian Sugar Planters' Association, having defeated *Perkinsiella*, as related above, is hoping now to find enemies of *Sphenophorus* and keeps for this work an entomologist, Muir, traveling in Malaysia, to search for parasites of this species.

He has so far succeeded in finding two predators: one *Histerid* and one *Elaterid* besides a Dipteron, an endophagous *Tachinid*. The breeding of the first two had begun in Honolulu. We shall learn this year the result of this introduction and of the others later.

DIPTERA. CERATITIS CAPITATA.

Ceratitis capitata, "orange fly" as we call it, is actually spread over southern Europe, North and South Africa, Canary Islands, Bermuda, Mauritius, a large part of Australia and South America south of Rio de Janeiro.

Its original home seems to be the Mediterranean region where it causes periodical damage.

The female of this species deposits eggs in the pulp of many fruits among which in our country oranges, peaches, apricots, indian figs, and in exotic countries besides these in various fruits

titis has always been considered one of the worst fruit pests, agriculturists are therefore very much prejudiced against it and have instructed entomologists to study it particularly. Various artificial remedies have been recommended but all without practical result, hence in this more than in any other case the natural fighting method has been given consideration.

Australia was first in entrusting to G. Compere the task of establishing the real home of *Ceratitis*, searching there for parasites and sending them to Australia.

Compere, with the enthusiasm and the confidence which he has in the natural fighting method, embarked at once on a voyage to carry out his task, and believing that *Ceratitis* had probably been introduced in Spain, and from there to southern Europe from some Spanish colony, went before all to the Philippine Islands then also to China and Japan, but without succeeding to find *Ceratitis*. From Japan he went to California, which State also subsidized him for the search of parasites and from there to Europe (1903) where he first visited Spain and then France and Italy.

In Spain he found parasites of *Carpocapsa*, but neither in that country nor in the others those of *Ceratitis*. He thereupon returned to Australia and shortly afterwards went to Ceylon and India where he had occasion to observe several species of fruit flies and their parasites but not *Ceratitis*.

With admirable perseverance on his part, though still greater on the part of the governments which paid the necessary expenses, he went in 1904 to Brazil, where he knew, from information received, that *Ceratitis* was to be found. There he succeeded in finding parasitic *Ichneumons* and a *Staphylinid* predator of that species. Believing that those would be able to control *Ceratitis*, he collected considerable numbers of the *Staphylinid* and parasitised pupae of the fly, brought them to Australia alive and in his report shouted victory a little too optimistically when he wrote: "In Brazil as in India, the power of nature to keep this destructive fly under control is complete" and further on "once these parasites shall have become acclimatised in Western Australia nothing more is to be feared from *Ceratitis*, the most innocuous indigenous insect."

This optimism enthused also the entomologists of Natal and Cape Colony who, upon informing their respective governments of the results anticipated in Australia with the introduction of parasites of *Ceratitis* from Brazil, at once obtained the means to go to South America.

C. Fuller and C. P. Lounsbury left on the 4th of January from Capetown and arrived at Bahia on the 28th of the same month. Fuller made his observations only in this locality, while Lounsbury visited also Rio de Janeiro, Sao Paula, Montevideo and Buenos Aires.

The result of this voyage was not very encouraging; they did not find the predatory *Staphylinid* of Compere and obtained only one *Braconid* (*Opiellus trimaculatus*) of another species of fruit fly (*Anastrepha fratercula*). Besides from information gathered by Lounsbury it was concluded that *Ceratitis* had been introduced in South America more recently than in South Africa. The little material which Fuller brought to Natal arrived dead.

Compere returned from Australia to Spain to collect there the parasites of *Carpocapsa* for California. From here he went once more to Brazil arriving at Bahia February, 1905. He collected more fruit fly parasites and took them to West Australia liberating them as before.

The Brazilian parasites not having furnished good proof of their activity, contrary to the great hopes reposed in them, Compere returned in 1906 to India to collect parasites of *Dacus*, succeeded in finding several and taking them to Perth, but having arrived there during the Australia winter they perished for lack of hosts.

In May, 1907, still confident in the ability to acclimatize the Indian parasites of *Dacus* in Australia to fight *Ceratitis* he again returned to India and through his perseverance was crowned by a success which seems to promise good results.

In few months he collected from seventy to a hundred thousand parasitised pupae and, notwithstanding the fact that the journey took ninety days, he succeeded to bring them to Perth, West Australia, in good condition on the 7th of December.

On the 11th of the same month the first parasite issued and in the days following hundreds and thousands of specimens came.

Three species of parasites came out of the pupae and as many as thirty-six specimens of one of them were seen to issue from one pupa, twenty on the average, while of the other two generally a single specimen lodged in one pupa. On the 11th of December fruit infected by *Ceratitis* was placed in cages containing parasites and on the 7th of January adults of the parasite were obtained from them.

In April, 1908, about 120,000 parasites had been obtained which were distributed in the regions most infected by fruit fly and 20,000 were sent to South Africa.

In the same month pupae of *Ceratitis* taken from the locality where the parasites had been liberated, were examined and a certain number was found to be infected by the Indian parasite. That much was certain, that at least temporarily the parasites of *Dacus* of India had been established on *Ceratitis* in Australia. It is very likely that their acclimatization will be definite and that they will succeed in subduing *Ceratitis*. This will be a great victory, the most beautiful perhaps obtained up to date, because in order to achieve it there was necessary an exceptionally pertinacious conviction of an entomologist and also an exceptionally pertinacious confidence of a government in its employe.

While Compere succeeded in finding efficient parasites in India to fight the orange fly, another Australian entomologist, Prof. W. Froggatt, of New South Wales, had the commission from several governments of the Federation to the principal countries of the world to gather information about the distribution of *capitata*, the means of fighting it and its parasites.

He went from Sidney to the Hawaiian Islands, Mexico, Cuba, East India, United States, England, Spain, France, Italy, Australia, Turkey, Cyprus, Egypt, India and Ceylon. On this long journey he did not collect any parasites, merely made arrangements with Indian entomologists to obtain them, though manifesting considerable skepticism about the practical utility of the natural fight against *Ceratitis*.

This example of *capitata* has for us Italians a certain interest in account of *Ceratitis* itself, because we know now that other parasites capable of fighting it exist and that by introducing them in our country we can increase the number of causes inimical to and so subdue it entirely or better present conditions. This example further has an extraordinary importance because it confirms what I have always maintained, namely, that a natural fight against the olive fly is possible by means of parasites of the same species of *Dacus*, which might be found in Asia or in Africa and also by means of parasites of other *Dacus* and even by other genera of *Tripetidae* of Asia, Africa and America.

It would be indeed a crime if specially at this time, after the experiment with parasites of *Dacus* from India, transported, acclimated and adapted to fight *Ceratitis* in Australia with complete success, we would not also try with the greatest confidence the introduction of parasites first from Asia and then from other regions if necessary.

I proposed this at the International Congress of olive growers in Toulon, proposed it also to our R. Ministry of Agriculture repeating what in large part I had also set forth in 1905 (September) and 1906 and what I had always maintained, even attacking in 1907 contrary affirmations by others.

LYPEROSIA IRRITANS (L.).

This fly sucking the blood of various domestic animals has its origin in Europe and was imported to the United States of North America between 1885 and 1887, spreading all over that country. In 1897 it was brought to Oahu and was noticed in the year following also on the other Hawaiian Islands. Favored in its new home by a warm and moist climate it multiplied tremendously, causing serious injury to cattle.

In Hawaii many artificial measures, preventive and curative, have been tried but have given poor results, and several years ago a natural fight against this insect has been undertaken.

Koebele went in 1906 to the United States and sent from Arizona to Hawaii two hymenopterous parasites of *Lyperosia*, namely, *Eucoila impatiens* Say, *Eutrias* sp. and several Coleoptera living in dung and considered predatory on the larvae of this insect: *Histerid* sp., *Copris carolina* L. and six other species. Of these parasites one species of *Histeridae* and *Eucoila* have become acclimated, but up to the present they have multiplied little and as it appeared that they could be little relied upon, Koebele was sent to Europe in 1908, where he still is, in search of parasites of this fly known in America and Hawaii under the name of "Horn fly" (*Haematobia serrata* Desv.).

ACARIDAE. (TETRANYCHIUS TELARIUS L.).

This mite, probably of European origin, is now spread almost over the whole earth. It lives on leaves of numerous plants, including citrus, on which it had specially spread in California, favored by a dry climate.

George Compere observed in Australia a very small Coccinellid (*Scymnus vagans*) breeding on this mite, collected a considerable number of specimens and took them to California where they became acclimated excellently.

The same species of *Scymus* was later introduced for the same purpose in the Hawaiian Islands where it also became acclimated.

IXODIDAE.

In 1907 L. O. Howard described the first species of the Hymenopteron, *Encyrtid* (*Ixodiphagus texanus* How.) parasite of a tick, *Haemaphysalis leporispalustris* Pack. In 1908 the same author described another species of the same group, *Hunterellus Hookeri* How., parasite of another tick, *Rhipicephalus texanus* Banks. In consequence of the discovery of this Hymenopterous parasite in the United States its biology was studied to see whether it would be possible to multiply and use it to fight *Margaropus annulatus* (Say), the tick which transmits the Texas fever. Hunter, who is at the head of the laboratory at Dallas, where the tick is studied, sent in 1907 specimens of parasitised ticks to Lounsbury in South Africa and others to the laboratory of Portici, where they are at present under observation in tubes.

In the spring when parasites will issue, it will be my duty to get Italian ticks, especially *Margaropus*, infested by them; for in our country, also in the Roman campagna and elsewhere, the tick transmits *Piroplasma*, which causes bovine malaria.

If this experiment proves successful it will certainly be of great advantage to the cattle industry.

OTHER APPLICATIONS OF INSECTS IN AGRICULTURE.

So far I have spoken of insects used for the destruction of insects injurious to agriculture and cattle, but I think it would be well to record in conclusion the other experiments which have been made up to now to utilize insects in the fecundation of plants and in the destruction of harmful plants.

BOMBUS.

Red clover is one of the plants which in order to give complete fructification, needs the intervention of insects (bees). In fact since the observations published by Darwin it has been observed that blossoms visited by bees produce five or six times as many seeds as those which are protected.

This plant was introduced in New Zealand during the first half of the last century, but as it only produced few seeds several species of *Bombus* (*B. terrestris* var. *virginialis* Kirby, *B. hortorum* L., *B. hortorum* var. *harrisellus* Kirby) had to be introduced from England; these became acclimated and multiplied greatly helping the work of the bees (*Apis mellifica* L. and *A. ligustica* Spin.) in fecundating the flowers of red clover. As a result of the introduction of these insects as good and abundant seeds are produced in New Zealand as in Europe.

Several years ago the cultivation of red clover was also begun in the Philippine Islands where it produces few seeds on account of the lack of insects fitted for the fecundation of the flowers. The United States are now about to increase the seed production there by sending species of North American *Bombus*.

BLASTOPHAGA GROSSORUM GRAVEN.

California, the promised land of the fruit grower, never let an occasion pass to introduce every possible variety of fruit and even created under the ingenious impulse of Burbank a great number of new ones, but it is to a small insect, the Hymenopteron of captivation, that they owe one of the best qualities of figs of Europe.

About 1880 there were introduced in California by Julian P. Rixford three varieties of Smyrna figs and one capri fig. In 1885 fig seeds from Smyrna were planted and from them came beautiful green trees, which in 1889 had trunks 10 to 15 centimetres in diameter.

In 1890 the Division of Pomology of the United States Department of Agriculture imported branches of capri fig from Smyrna and distributed them in many States, including California. But notwithstanding every care, the Smyrna figs failed to mature and fell off. Then the importation of *Blastophaga* was decided on at the suggestion of G. Eisen, who was familiar with all the studies

which had been made in Europe in caprification. He made this proposition to Mr. Shinn, who happened to have in his fruit garden Smyrna figs for about ten years. As it happened Shinn had a friend in Smyrna to whom he wrote immediately asking to send him capri figs. Mr. Shinn's friend obligingly did so. In August, 1891, the fig trees arrived from Smyrna in pretty good condition, still having on them many *Blastophaga* alive, which, on advice of Eisen, were released on the capri and neighboring trees.

But this first importation remained without success, also several later ones up to 1899 when the Division of Entomology, of which Prof. L. O. Howard was chief, in coöperation with that of botany made a determined effort to introduce and acclimatize *Blastophaga*.

W. T. Swingle was sent that year to Greece for that purpose, he having already in 1898 taken great interest in caprification while at Naples studying at the zoological station, and made from Italy shipments of fig trees from which the *Blastophaga*, as is believed, did not thrive. From Greece Swingle sent other varieties of capri figs to America and a little later also other slips and one capri fig three metres high from Algeria.

In the following spring he sent eight boxes with "Mamme" of capri figs, which arrived in Washington in good condition and from there they were sent to Roeding in California, who, by this time, after so many failures, had become very skeptical, but still did with care all that Howard had suggested.

The numerous *Blastophaga* which developed from these or "mamme" sent by Swingle, entered the fruit of the Smyrna figs and those of the local capri fig, so they were finally able to proclaim in 1900 the definite acclimatization of that, by California fruit growers so much desired, insect and to begin a new era in the culture and commerce of figs also in that country.

B. grossorum has been introduced in California without the parasites which destroy it in Europe therefore it has become more numerous there than in the latter country.

From California *Blastophaga* has been introduced also to South Africa with complete success.

LANTANA INSECTS.

The Lantana (*Fam. Verbenaceae*) was introduced in the Hawaiian Islands from Mexico in 1858 as an ornamental plant, but favored by climate and lack of enemies, it was disseminated everywhere by the Indian Myna bird (*Acridotheres*), which was imported to Hawaii for the destruction of caterpillars and found also Lantana seed to its liking. Gradually it took possession of districts which were used as natural pasture on the plains, hills and mountains and became very troublesome to remove from cultivated land, especially sugar land. About 1900 it constituted a real serious problem for Hawaiian agriculture, but fortunately Koebele was then entomologist in the Islands, and he in this in-

stance also had a happy idea, namely, to go to Mexico study there the insects that live on lantana and send them alive, without their enemies to Hawaii. Convinced that if the causes inimical to lantana prevented it in Mexico from overrunning territory so as to become injurious, at least some of the same inimical causes (the insects) taken to Hawaii without their parasites will probably hinder much the development of lantana.

Koebele at once received the necessary means and went to Mexico in 1902 where he collected many living insects on various parts of the plant and sent them in repeated shipments to Honolulu. There Dr. Perkins took care of the material sent by Koebele and raised specimens of the various species. Of these the following are known with certainty to have become acclimated: *Agromyza* sp. (Dipteron), *Pterophorus* sp., *Lycaenidae*, two spp., *Lithocolletis* sp. (Lepidoptera); *Teleonemia lantanae* Dist. (Hemipteron).

The larva of *Agromyza* lives in the lantana seed, which is gradually destroyed by it.

The Lantana fruit attacked by *Agromyza* differs in appearance from the unaffected by being smaller, hard and remaining attached to the stem, while the others are soft on the outside and fall to the ground at once. *Agromyza* has multiplied to such an extent that it is now difficult to find lantana plants with healthy seeds.

Pterophorus lives in the larval state in the lantana flowers, which are in appearance small, atrophied and dark of color. It buries itself in the base of the flower, which it enlarges a little destroying that part which should serve for the development of the seeds. Also this species and two following ones are now quite common.

The *Lycaenid* species deposit their eggs on the young blossoms of the lantana and their larvae destroy flowers and young seeds.

The four above named species are all given to the destruction of the flowers and seeds of lantana and thereby prevent its further dissemination. *Lithocolletis* on the other hand bores galleries in the leaves and *Teleonemia* sucks leaves and flowers. The latter two insects defoliate the lantana plant several times during the year and to these is added the draining work of a scalebug, *Orthezia insignis* Dough., which was not introduced by Koebele, the time and manner of its importation being unknown.

The result of the introduction of these and other insects, including a Dipteron that produces galls on the branches, has been to arrest the diffusion of lantana in the Hawaiian Islands and to have it now loaded with so many enemies that they finally must gain complete control, agriculturally speaking.

When in September, 1908, I went from Honolulu to nearby Mount Tantalus, I had occasion to see everywhere on the sides of the mountain before arriving at the native forest, more or less extended areas completely overrun by lantana which was

almost entirely without leaves and without flowers. Elsewhere I observed the same thing.

This ingenious idea of Koebele was also in this case a complete success and will lead to other good results in similar cases.

This method presents very grave danger, to avoid which exceptional and able caution is necessary because only such insect species must be introduced as have very specialized habits, like the *Agromyza* and *Pterophorus*, which almost certainly will not be able to adapt themselves suddenly and produce the same changes in plants of other species.

But when it is a question of insects which eat or mine the leaves or sucking insects prudence demands a very accurate study because it might happen that they, when transported to other regions, would adapt themselves to other plants and then it would become necessary to have recourse to the introduction of their parasites with much probability but without certainty of their efficacy in the new home.

In Hawaii none of the species introduced by Koebele has invaded other plants than lantana, only specimens of *Teleonemia* have been seen on some local plant, but without staying there long and with reproducing; therefore I repeat, for the present Koebele's success also in the fight against a plant which had become injurious has been a complete success.

Lantana was introduced also in New Caledonia, it is not known when, and as it began to propagate in an alarming manner, the insects introduced by Koebele in Hawaii were asked for, a first shipment has been made, but I do not know the result.

UTILIZATION OF VERTEBRATES FOR THE DESTRUCTION OF INJURIOUS INSECTS.

BIRDS.

The subject of the greater or lesser utility of insectivorous birds has been much debated and always with the same result, that is to leave everyone with the opinion he had before, because in the case of indigenous birds it is very difficult to appreciate their real value and therefore the few facts which are observed are used by some in one sense and by others in a contrary one. I, for my part, rather believe that the usefulness and the harm of insectivorous birds balance each other and that more frequently the former may be superior to the latter, considering things only from the view point of immediate agricultural interest.

There always have been and there still are so-called ornithophiles who have attributed to insectivorous birds a large part in fighting injurious insects and who have, besides recommending the protection of indigenous birds, also advocated the introduction in other regions of insectivorous birds.

About the middle of the nineteenth century *Acridotheres tristis* was introduced from India to the island of Mauritius, became

acclimated there and multiplied greatly under protection of a special law. To it was attributed the cessation of the damage previously caused by grasshoppers and other insects.

In 1867-68 the attempt was made to introduce the same species from Algeria to fight grasshoppers there, but on account of the cold winter *A. tristis* did not become acclimatized there.

The same bird was imported to the Hawaiian Islands where it became acclimated and multiplied greatly destroying a certain number of harmful insects, but eating also the fruit of lantana, disseminating it, as I mentioned before, with much injury to agriculture.

Craw [Kotinsky] relates that in 1905, when at Makawao, on the island of Maui, he was told by a farmer, that after the absence of lantana seeds (after the introduction by Koebele of the Mexican insects) the Myna birds had deserted that locality, the result of which was that the caterpillar of *Heliophila unipuncta* Haw. became more numerous than what it had been during the previous twenty years.

AMPHIBIA AND FISH.

Among these classes of vertebrates are counted many species, which are altogether or primarily insectivorous and in these a certain amount of confidence has been reposed for the fight against mosquitoes.

In 1900 Koebele introduced from California to Hawaii the salamander *Diemyctylus torosus* Esch., which has become acclimated and has also several species of *Anuri*.

Van Dine asked for and obtained in 1904 the means (\$1,500) to introduce to Hawaii several species of North American fish of the family Poeciliidae (*Molliensia latipinna*, *Fundulis grandis*, *Gambusia affinis*) which feed mainly on larvae, pupae and eggs of *Culicidae*.

He asked the celebrated ichthyologist, Prof. Jordan, to entrust to a competent person the commission to collect and take to Hawaii these fish, which Dr. Jordan himself had indicated as active destroyers of mosquito-larvae. Jordan gave the commission to Alvin Seale, who went to Texas to collect the desired species of fish and succeeded in bringing more than 400 specimens to Honolulu alive. These were liberated in suitable small swamps where they lived and multiplied excellently. They have already been distributed over all the islands and will certainly contribute considerably to the destruction of *Culicidae*.

Carassius auratus has also been introduced to the Hawaiian Islands and liberated in various localities for the purpose of destroying mosquito larvae. I believe that much can still be done against mosquitoes in the way of natural warfare.

CONCLUSION.

I have briefly set forth the actual organization of agricultural entomology in the United States, the methods of fight used there

and the results and I believe it to be just to acknowledge that much has been accomplished in that country, much more perhaps than in all other countries combined; nevertheless, notwithstanding the number of persons occupied with agricultural entomology, notwithstanding the favor with which their advice is accepted and put into practice, it is known, from an approximate calculation by Dr. Marlatt, vice director of the Entomological Bureau of the Department of Agriculture, that the annual loss due to the work of insects amounts in the United States to a sum of seven hundred million dollars!

* * * * *

We have to deal here with an enormous sum which many will at first perhaps consider greatly exaggerated but, if they will examine industry for industry and take the difference between the crop that might be had and the actual crop, even with the present cultural methods, they will find that this sum falls perhaps behind the truth.

It is a real fact, I believe, however painful the fact may be, that the majority of agriculturists have been used for years to see crops reduced by one insect or another and that they have become reconciled to such losses believing that there is no way of preventing them.

On the other hand it would be well if our farmers could be convinced that up to date agricultural economy, if provided with sufficient personnel and means, is in the majority of cases in position to devise if not perfect methods at least such as are apt to diminish the injury caused by insects. There will be cases in which the entomologists will not be able to propose in a short time sure and practical methods of fight; but I believe that it is hardly possible that after prolonged, profound and conscientious study of a given question and with all the means at hand, they should not arrive at some practical result. Our agriculturists should have greatest confidence in science, because it can always return hundred fold what it receives, but at the same time they must support it with their good will as well as with their means; it is in this that they are now lacking in our country, and the consequence of this lack (and not of willingness and genius) is the lack of persons who can give their whole lives to the study of pure and applied sciences.

* * * * *

Confining myself to my own field of agricultural entomology I affirm that it is absolutely necessary that the entomological section of the Ministry of Agriculture, besides some administrative employees, should be composed of a technical director with about fifteen entomological assistants. Some of these should be located in the Ministry proper in order to occupy themselves particularly with the systematic study of insect parasites of scale-bugs and of some other insect families which require on account of the number

f species and the difficulty of distinguishing them, the work of men who dedicate their whole lives to such tasks.

Some entomologists should make a study of general biology and others should be given charge of the particulars of the given insect or of insects harmful to a certain industry and they should be located in field laboratories established in those localities which are best adapted for carrying on the various studies. There should be at least one entomologist each for the insects of olives, grape vines, fruit trees, forests, citrus fruit and cereals.

These entomologists should study their subject exclusively and be directly responsible to the technical director at the head of this section, so that they could not digress under any pretext. It is absolutely necessary that each entomologist should study for many years one or two insects because only in this way knowledge can be gained about the most minute particulars of the life of an injurious insect or of those which stand in relation to them this being indispensable in order to know the best way and the most opportune for initiating the artificial or natural fight against an injurious insect. At present our ignorance even about the biology of the most common insect is extreme but this deplorable condition must absolutely cease if the enormous losses which our national economy actually suffers through the work of so many insects are to be reduced to some extent.

It is further necessary for the progress of agricultural entomology that good laboratories of general agricultural entomology should be created at the higher schools of agriculture which would be in a position to function as entomological district stations. One of these should be created in Puglia, one in Sardinia and one in Sicily.

With such an organization of agricultural entomology a new era would begin in Italy in the fight against harmful insects, in which beneficial effects would not be slow in making themselves felt in all agriculture.

What do the United States teach us in regard to insecticides? They have tried many of them and have recognized as the best hydrocyanic acid gas, arsenical substances and the mixture of sulphur and lime.

Following their example we must experiment without hesitation with the same insecticides against the same insects and against insects with similar habits if economically convenient. There is no reason for casting aside the first two because they are very poisonous and the third one because it requires a little time for preparation. The gases of cyanide acid used with the necessary precaution are harmless and the same may be said of the arsenical substances, while their efficiency in destroying insects is certain. The sulphur and lime mixture is a very good insecticide and has the additional advantage of substituting in many cases petroleum and tar-oil, which are more expensive (and specially the former, even the imported) and of increasing the consumption of sulphur of which our industry is much in need.

For the application of insecticides in Italy, where the large proprietors are few the institution of coöperative societies is to be recommended as has rightly been suggested in the case of *Diaspis*.

Besides it is necessary that the entomological laboratories should have practical, level-headed men to whom the manipulation of experiments can be entrusted because it is impossible for the entomologists themselves to spend a large part of their time with duties, which can be excellently performed by persons with an elementary agricultural education. These same practitioners could be sent out to direct the application of insecticides when there are special requests from individuals or coöperation who have as yet not the proper men.

Organized in this manner the artificial fight under the direction of entomologists who know the biology of the insect to be attacked and supervised by practical men, would certainly give the desired results.

As for the natural fight, finally, it must be stated that in the United States it has already produced some excellent and some partial results; that in Hawaii it has been applied with good results in most cases; that in Australia it has already produced beneficial effects and that better ones are to be expected in the near future. In our country it has offered very successful proof in the case of *Noctua cardinalis* introduced for fighting *Icerya*, which otherwise might have destroyed our citrus industry. At present we are trying the natural method against *Diaspis pentagona* and other insects, I have imported in October, 1908, the following species of Coccinellids.

Cryptolaemus montrouzieri predator of *Dactylopius*.

Rhizobius lophantae predator of *Diaspinae*.

Rhizobius ventralis predator of *Lecanium*.

Chilocorus bixulnerus predator of *Diaspinae*.

Hippodamia convergens predator of Aphis and specially *Schizoneura*.

Coccinella californica predator of Aphis and specially *Schizoneura*.

Coccinella abdominalis predator of Aphis and specially *Schizoneura*.

Mcgilla vittigera predator of Aphis and specially *Aphis brassicae* L.

During the current year we shall see the results of these trials.

I am convinced that the natural method of fight is the one which can produce surprising results beyond all expectation, and that it constitutes the sole anchor of salvation when insects are to be fought which attack very extensively the cultivation of a certain plant as is the case with olives in our country, in southern Italy, and in other parts.

It is necessary that the agricultural entomologists should seek to introduce from other continents not only the parasites of the

imported species, but all those of indigenous species and of species and families related to the indigenous ones.

Everything possible must be tried with the confidence that in some case the best results might be obtained.

I have said before that it is necessary to know the biology of indigenous parasites in order to appreciate as much as possible those which are most useful for the natural fight and in order to also multiply them when possible, but having to deal with forms which in our country have numerous inimical causes, we may perhaps never succeed in limiting these, if at all only very partially, while by introducing and acclimating a foreign primary parasite without his secondary parasite or parasites, we can obtain a continuous and very effective natural fight against certain insects.

Among the species of insects of foreign origin we must seek to fight by the introduction of their parasites *Diaspis pentagona* Tar., *Lepidosaphes citricola* Pack., *Parlatoria sisyphi* Luc., *Aonidiella aurantii* Mask., *Schizoneura lanigera* Hausm. The olive-fly is probably also of foreign origin, but even if such be not the case, I insist just the same in defending the attempt of the natural method to fight it by introducing its enemies which probably exist in Asia and Africa, and the enemies of the other species of *Dacus*, which live principally in India.

The natural fight must always be tried with the greatest confidence and since it required only one expense during the studies and necessary researches for one or a few years, while its result may be the best and continuous, it must be abandoned only after all possible trials have failed.

In order to be able to apply the natural fight the most profound biological knowledge of the insects to be fought and of their parasites is necessary because the cases in which matters are quite simple as in the case of *Icerya* and of *Novius* are few; therefore the institution of a large entomological section near the Ministry of Agriculture is more than ever necessary.

For the introduction of parasites from abroad I believe the International Institute of Agriculture can be relied upon to a great extent, when the entomological section will be well organized there, but at all events it will be always necessary to have also in Italy a traveling entomologist, who has acquired a knowledge of foreign injurious insects and of their parasites in the countries which they inhabit, in order to be able to select on a solid scientific basis the species necessary for the fight against indigenous insects or those imported in Italy.

One other fact to which I believe it is timely to call the attention of farmers is the great danger which always threatens our industries and which lies in the possible easy introduction of some foreign injurious insect. The *Diaspis* of the mulberry tree for instance.

There are various scale bugs, which we fortunately have not yet and which elsewhere inflict severe damage to the fruit industry and which may reach us at any moment from across the ocean in consequence of the fact that we do not exercise any surveillance in our ports over plants and fruits imported from foreign countries.

It is necessary to establish a rigorous service of inspection and disinfection in our principal ports and to prohibit absolutely in others the entrance of living plants and fresh fruits otherwise *Aspidiotus perniciosus*, so widely spread in the United States, will before long expose our entire fruit production to serious danger and the same may be said of many insects which possibly in their original home cause little or no damage while in our country they might become real scourges.

Special surveillance should be exercised over plants imported by nursery men. These are the principal if not the sole introducers of injurious insects and fungi even from the most distant regions as they are also the principal propagators of such misfortunes in one and the same region. In fact, in order to be able to offer to their customers new varieties of species of fruit or ornamental plants, these people frequently send for small plants to any country and with these they may introduce diseases which are really unknown. In the nurseries then the insects (or fungi) find an environment congenial for their development and multiplication and when the little plants are sold their enemies go with them.

Therefore a law would be necessary, which besides imposing the disinfection of imported plants, would require that each nursery man should be visited once or twice every year by an entomologist and that in case any plants should be found infected by a new disease, they should be destroyed, or if a certain disease should already exist in Italy but not in all the provinces it should be forbidden to send plants to the immune provinces.

With this last wish for an inspection and disinfection of plants imported from abroad, which I formulate after the example of that which I have seen vigorously enforced in the ports of San Francisco and Honolulu I have finished my account and take leave of you, thanking you for having listened with such great indulgence and recommending that you may keep in mind that in order to safeguard the agricultural industry of Italy it is necessary that applied entomology, as well as plant pathology should be held in the highest esteem because to improve or innovate methods of cultivation is of no value if a better knowledge of plant enemies, which would permit of finding proper means to defend the greatest wealth of our country, does not keep even step with it.

The example of the United States of North America may serve us as a guide and stimulus!

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

Division of Entomology.

REPORT OF SUPERINTENDENT OF ENTOMOLOGY FOR JUNE, 1909.

Honorable Board of Commissioners of
Agriculture and Forestry,
Territory of Hawaii,

Gentlemen: I beg to submit herewith my report covering the work of the Division of Entomology during the month of June, in addition to the oral report on the Melon Fly parasite and the fig wasp, submitted at your meeting July 7, 1909:

Inspection.

We examined 30 vessels, of which 15 brought matter subject to our inspection. The result of this inspection is shown in the following table:

Disposal with Principal Causes.	Lots.	Parcels.
Passed as free from pests.....	397	5743
Ordered returned	1	15
Fumigated before releasing.....	17	32
Burned	3	7
Dipped in Bordeaux.....	1	1
	<hr/>	<hr/>
Total examined	419	5798

Among the more important pests excluded were two species of Snout beetles (*Curculionidae*), a leaf beetle (*Chrysomelid*), a click beetle (*Elaterid*), and cockroach (*Phyllodromia hieroglyphica*) on Orchids from Manila; a species of chaff scale (*Parlatoria*) from Japan. Palm scale (*Aspidiotus palmae*), mealy bugs (*Pseudococcus* sp.), whitewash scale (*Hemichionaspis* sp.), thread scale (*Ischnaspis longirostris*), leaf miner, a leaf hopper on *Nephelium*, larvae of a banana borer, colony of ants, rose-leaf caterpillar and a long horned (*Cerambycid*) rose borer on a collection of plants from Singapore; the bean weevil (*Bruchus obtectus*) in beans from Spain in the mails; parasitic fungus on yams from the Orient.

As a courtesy to our citizens we fumigated a lot of cut flowers and 26 cases of pineapples shipped to the Coast.

At the request of the manager of the Cable Company we collected, fumigated and sent to Midway by the last *Flaurence Ward* a parcel of sand-binding grass. This grass I first saw

and its value as fodder for cattle and as sand-binding agent observed about a year ago when living at the beach in the Hobron house. Its identity I could not ascertain, in fact it is not known to this day. I have since found it growing on Quarantine Island and doing valuable service there.

Pineapple Scale.

The first three days of the month I spent in Wahiawa in study and observation of the insects affecting the pineapple plant, especially the scale bug (*Diaspis bromeliac*). I have traveled in all directions, alone and in company, afoot, on horse back or in buggy, and discussed the question with many growers. Our conclusions are that the scale bug is insignificant on vigorous plants; it is kept well in check by a parasite which is active principally on the males (the little, white, keeled bodies, principally on underside of leaves); a fungus was also found attacking the scale bug; and finally the scale bug is most numerous where the growing conditions of the plant are unfavorable. Nevertheless there was consensus of opinion that plants would be greatly benefited by being fumigated before setting out. This practice I have been recommending for some time now, although no occasion for publishing the advice has presented itself. The fact is that although the scale bug is widely prevalent in the pineapple fields at no time or place could serious damage be attributed to it. There is no danger of the scale ever becoming a menace to the industry. Yet in view of the comparative ease and inexpensiveness of treatment and the undoubted advantage of eliminating a drain upon the plant's vitality, the advisability of fumigation of plants is beyond question. The treatment would also kill the mealy bugs which are rather numerous in places.

It may not be out of place to relate that one of the fresh pineapple shippers in Wahiawa confirmed our observation of a little over a year ago that fruit fumigated with a strong dose of hydrocyanic acid gas before shipment stands a long journey better than after any other treatment.

At Leilehua I was glad to find the Arizona dung fly parasite breeding. It was taken there shortly after introduction on the islands. This insect is apparently making no impression on the horn fly, which was thicker there at the time than I ever saw it anywhere. But the stable fly (*Stomoxys calcitrans*), which is also blood sucking, has been perceptibly reduced by this parasite.

The Torpedo bug parasite (*Aphanomerus pusillus*) was found established in and about Wahiawa and keeping the pest well within bounds.

White Fly Enemy.—Sometime ago we received by courtesy

of the Florida Agricultural Experiment Station authorities a collection of fungi attacking white fly or mealy wing (Aleyrodidae) in that State. Mr. L. Lewton-Brain, our honorary plant pathologist, to whom I turned them over, reported that all but one had died en route. Of the survivor he made several tubes of isolated cultures and one of these we applied to a tree infested with a similar pest.

A colony of horn fly enemies was received from Mr. Koebele and turned over to Mr. Swezey of the Sugar Planters' Station for attention.

Yours respectfully,

JACOB KOTINSKY,
Superintendent of Entomology.

REPORT OF SUPERINTENDENT OF ENTOMOLOGY
ORALLY SUBMITTED AT BOARD MEETING,
HELD JULY 7, 1909.

We received on the 24th a colony of fruit fly parasites from the entomologist of West Australia who, on his way to the Orient, took it with him to Sydney where he placed it in care of the butcher on board the S. S. Aorangi. All possible precautions have been taken to prevent any of the host flies from escaping here. Mr. Compere, about a year ago, left a series of specimens of these parasites with Dr. Perkins for identification. Dr. Perkins named them before leaving as best he could and left them in the cabinet of the H. S. P. A. Experiment Station where they will serve for comparison with the flies to issue. In anticipation of the possible coming of these interesting insects Dr. Perkins secured the consent of the H. S. P. A. to coöperate with us and detailed Mr. Swezey, one of their able staff, to attend to this work. To him the colony was intrusted to breed and make the most of. Because the original host of these parasites was congeneric with our own melon fly and therefore closer related than the Australian fruit fly better results are hoped for. Asked how long it would take to ascertain whether the parasites will attack the fly. Mr. Kotinsky replied, at least, two weeks.

By aid of the press representatives in attendance Mr. Kotinsky wished to impress upon the community the importance of burning up all material infested with melon fly as such material left on the ground forms ideal propagating medium for countless numbers of the fly. He cited an instance of an abandoned vegetable garden on King street, where he found thousands of cucumbers and millions of maggots in one of the fields. If people would take the precaution to destroy all infested material they would help to keep the fly down and save themselves and their neighbors a lot of trouble and expense.

Asked if the Board had any police authority in matters of this kind, Mr. Kotinsky replied in the affirmative. Sections of the Revised Statutes pertaining to this subject were read. It was moved by Mr. von Holt, seconded by Mr. Isenberg, that the Board of Agriculture and Forestry, through its proper officer, take immediate action in causing the destruction of all infested fields, particularly the cucumber field in question, in accordance with Section 2, paragraph 2, Session Laws of 1890. Carried.

Mr. Kotinsky also referred to results thus far obtained in the effort to introduce the Smyrna fig insect into the Territory. By way of explanation he said that the successful production of Smyrna figs is impossible in the absence of this wasp, which alone carries the pollen from the capri or male flower bearing figs to the Smyrna or female flower bearing figs. Introduced into California about 1899 this insect has enabled the annual production of profitable crops of the now famous Calimyrna fig. During the past two years we received several colonies of the insect by courtesy of the Fancher Creek Nursery people. Unlike any of their predecessors the last two colonies brought live insects with good prospects of infesting the figs on the trees. This prospect was realized as several figs were found inhabited at Moanalua the other day. Seemingly therefore we are a step nearer the successful establishment of the Smyrna fig culture in Hawaii.

One of the successful colonies received came through Mr. W. T. Swingle of the U. S. Department of Agriculture. In connection with it he wrote saying that the Department experimental fig orchard at Loomis, California, will be ready this winter to distribute plants and cuttings of choice capri and Smyrna fig trees. Application blanks with circular of instructions may be secured at the following address: Walter T. Swingle, care G. P. Rixford, 1813 Pierce street, San Francisco, California. In view of our large areas of uncultivated lands that apparently could be utilized for profitable fig culture it is urged upon every one so disposed to take advantage of the offer.

Division of Animal Industry.

Honolulu, Hawaii, August 4, 1909.

Honorable Marston Campbell,
President and Executive Officer,
Board of Agriculture and Forestry,
Honolulu, Hawaii.

Sir:—I beg to report on the work of the Division of Animal Industry for the period from June 23d to the present date, as follows:

principal part of my time since my last report has been with the construction of the new quarantine station on Beach road, near Sheridan avenue. The plans for the building have been approved by you, actual work was begun on the 29th. During the entire month of July an average of 15 men per day were kept at work under the supervision of Mr. Morse of the Public Works Department, assisted by Mr. van der Huizen of this office. With the exception of the building of the woven wire fence, which is expected to be completed here shortly, the station can now be considered 90 per cent finished. From the beginning of the present month only 10 men are kept at work constructing and hanging gates. There still remains to be built three feed rooms, shelter in the rear and feed racks in the box stalls and isolation stalls and the fence fronting on the Beach road.

The quarantine station in Kalihi has been abandoned after removal of all the new lumber, which had been used during the month of June for repairing fences and gates. What is on the premises, that is fences, troughs, water-pipes, a large shed with a small adjoining office, will be sold at auction.

The quarantine station adjoining the Union Feed Company's has likewise been abandoned, the sheds and feed rooms have been taken down and removed to the new quarantine station. The wire enclosures with gates still remain intact, but will be removed as soon as convenient unless other disposition can be made of them.

Various importers of stock who have seen the new station express great satisfaction with it and I do not believe there will be any opposition on the part of anybody to their stock quarantined there, even before the Board is in a position to make its use compulsory.

In receipt of a letter from Dr. A. R. Glaizyer of Lihue, in which he states that the Kauai Plantation Association has engaged him as veterinarian with a salary of \$200 per month and asking that he be appointed Deputy Territorial Veterinarian by this Board. Knowing that the Board is in favor of this step I have had his commission made out and forwarded to you for the approval of the Board and for your signature. His appointment will be a great satisfaction to me. I have been working for more than two years for the purpose of obtaining official representations of this Board on the other islands. This will now be accomplished and the perfection of the Veterinary Sanitary Service of this Territory may be looked for when a suitable man can be found in the Hamakua and Kohala districts of Hawaii. I have received several applications for the place, but all from young men, recently graduated, none of whom I consider able for the position. I am, however, having the matter con-

stantly in mind and trust before long to be able to secure a good man.

I submit herewith a letter from Mr. O. A. Soutar of Kingston, Jamaica, requesting information in regard to the bone-meal treatment, which shows that the publications of the Board are read in distant countries:

Kingston, Jamaica, June 20th, 1909.

The Supt. of the Division of Animal Industry,
Honolulu, Hawaii.

Dear Sir:—In the February, 1908, number of the Hawaiian Forester and Agriculturist I read on page 36 of a very interesting discovery of yours in regard to a mixture containing lime salts which supplied to young cattle especially made improved development.

I cannot help but troubling you with the request for details of the mixture, as it appears my cattle are laboring under similar conditions.

Thanking you in anticipation,

I am, yours faithfully,

(S) A. O. SOUTAR.

I have finally to report that on July 3d, Mr. James McQueen, whom I was instructed by this Board to prosecute for violating the rules governing the importation of live stock to this Territory, was fined \$50.00 in one case, while sentence was suspended for thirteen months in the two other cases.

Since my last report there have only arrived two shipments of live stock of any importance. On July 3d the S. S. Missourian brought 153 hogs, all healthy, and on July 23d the S. S. Lurline brought four mules and five pigs. Besides this, nearly every incoming boat has brought poultry or dogs, all of which have been inspected.

On July 22d the Norwegian steamship Ocean Queen arrived in Honolulu from the Gilbert Islands, having on board one cow belonging to the ship and which was suffering from a severe case of mammitis due to injury received on board ship. This cow had been taken on board in Plymouth, England, and had never been off the ship since she left that port, some four months ago. As the cow was a large thoroughbred Devon and a splendid milker the captain was anxious to have her brought ashore here for treatment, and at the request of the attending veterinarian, Dr. Monsarrat, I cabled to Washington for permit to land the animal temporarily. This request being

granted the matter was submitted to the chairman of the Committee on Animal Industry with whose consent the cow was loaded on a dray and taken to the new quarantine station on the Beach road where a temporary pen had been constructed for her. The cow is now doing well and will be retained until the departure of the Ocean Queen, when she will be placed on board and the premises where she has been kept be thoroughly disinfected.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

Division of Forestry.

Honolulu, Hawaii, July 27, 1909.

Board of Commissioners of
Agriculture and Forestry,
Honolulu.

Gentlemen:—I have the honor to submit herewith the regular report of the Division of Forestry for the month of July, 1909:

Irrigation Congress at Spokane.

As the result of a meeting of the Territorial Conservation Commission of the Territory of Hawaii held at the call of the Governor on June 30, I was appointed early in the month a delegate officially to represent the Territory at the Seventeenth Irrigation Congress, to be held August 9-14, at Spokane, Washington. This special assignment has kept me busy for a considerable part of the month in gathering statistics and preparing a statement of the needs of Hawaii to be read at that Congress. The special object of sending a delegation to Spokane is to secure the endorsement of the Irrigation Congress in the extension to Hawaii of the Federal Reclamation Act. Every effort will be made to secure the passage of a resolution by the congress favoring this measure.

I have also been appointed by the Governor a delegate to represent Hawaii at a Conservation Congress to be held at Seattle on August 27-8-9, under the auspices of the Washington Conservation Association. I leave Honolulu on July 28 and expect to return on September 14.

Trip to Wahiawa.

On July 19 I visited the U. S. Cavalry Camp at Leilehua and located on the ground after a conference with Col. W. S. Schuyler, the commanding officer, the boundary of the proposed Waianae Hills Forest Reserve across the Federal Government land of Waianae-uka. On Tuesday, July 20, I visited and made an inspection of the wood cutting being done by Mr. W. L. Hopper on the portion of Waianae-uka to the East of Wahiawa. This work has been very much delayed because of continued wet weather that has made hauling out of the question and cutting difficult. From a forestry standpoint the work that has been done has been satisfactory.

Arbor Day Free Tree Distribution.

Arrangements are now complete whereby over 110,000 trees are being grown for free distribution on Arbor Day, the second Friday in November, 1909, to homesteaders and other owners of land throughout the Territory of Hawaii. Various sub-stations have been established on the several islands, at which trees will be grown for local distribution.

The station on Kauai is situated above the Kalaheo homesteads. The work in growing trees is being done under the general supervision of Mr. W. D. McBryde.

The trees for the island of Oahu will be grown at the Government Nursery and at the Experimental Garden in Makiki.

The stations on Maui are at Lahaina, under the direction of Mr. L. Weinzheimer; at Wailuku, where Mr. H. B. Penhallow is looking after the Board's interests; and at Makawao, where Mr. L. von Tempsky will grow for the Board several thousands of trees at the nurseries at the Haleakala Ranch.

On Hawaii sub-stations have been established in coöperation with interested friends of the Board. In Kona, under the direction of Mr. Jared G. Smith; at the Parker Ranch, Mr. A. W. Carter, manager; at Papaikou, under the direction of Mr. William McCluskey, and at Hilo, Brother Matthias Newell has consented to look after the growing distribution.

The stock at the Government Nursery in Honolulu will serve to supply districts where only comparatively few trees are wanted as well as to supplement with the species that are difficult to grow the stock of the sub-stations.

Mr. Haughs' report for this month gives interesting statistics in regard to the number of trees that are being grown and given out from the Government Nursery.

Botanical Collector's Trip.

On July 24 Mr. Joseph F. Rock, the botanical collector of the Division, returned from a collecting trip of about six weeks'

duration. During his trip Mr. Rock was able to collect a very considerable number of botanical specimens of rare trees and shrubs, and also to collect much seed of Hawaiian plants that will be exceedingly useful for exchange purposes.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

Honolulu, Hawaii, July 31, 1909.

Hon. Marston Campbell,
President and Executive Officer,
Board of Agriculture and Forestry,
Honolulu.

Dear Sir:—In the absence of Mr. Hosmer I herewith present to you a report of the work that has been done during the month of July.

Advice and Assistance.

At the request of Mr. Weinzheimer, manager of the Pioneer Mill Company, at Lahaina, the writer paid a visit to that place on July 7. The visit was made for the purpose of examining several tracts of land in the Kaanapali section of the plantation intended to be planted in trees. The lands intended to be planted include several gulches, also a tract containing about 50 acres between Waihakula and Kahama gulches. A report with recommendations has been drawn up, a copy of which has been sent to Mr. Weinzheimer, and the original placed on file in this office.

After leaving Mr. Weinzheimer a visit was made to Olowalu where along with Manager George Gibb, an examination was made of a tract of barren land close by the sea shore. This land is practically destitute of vegetation of any kind and the wind is gradually blowing the soil out to sea. The land is more or less salty, it being at times during high tides covered with sea water. The planting of Ironwood trees (*Casuarina equisetifolia*) was recommended for the tract.

The writer visited Wailuku after leaving Olowalu where, along with Manager Penhallow, an examination was made of the extensive tree planting that is being done on that plantation. A well established nursery is kept stocked with different kinds of trees suitable for the various locations intended to be planted. The work that is being done in tree planting by

the Wailuku plantation is very creditable indeed and is a good object lesson.

Nursery.

The principal work done in the Nursery has been the sowing of seeds and making preparations for the free distribution which is to take place in November. Enough seed of the kinds that take longest to propagate have already been sown and the others will be sown during the month of August so that all will be ready for the coming Arbor Day in November next.

Trees Sold and Given Gratis.

Sold 700 forest trees in transplant boxes.

Sold 360 forest trees, potted.

Gratis 3,500 forest trees in seed boxes.

Gratis 350 forest trees in transplant boxes.

Gratis 150 forest trees, potted.

The sum of \$14.20 was realized from the sale of plants during the month and the same has been deposited with the Treasurer as a realization.

Seed Collecting.

The seed collected during the month comprise 11 species of forest and shade trees and the total amount collected being 28 lbs. 3½ ozs.

Seed Distributed.

The seed distributed comprise 14 species and the total amount sent out being 3 lbs. 12 ozs. This seed has been distributed amongst the sub-nurseries that are being started on the other islands including the seed used at the Nursery here.

Seed Exchange.

The large quantity of seed collected by Mr. J. F. Rock is being sent into the nursery and will be awarded to a number of persons on our exchange list, including the seed of indigenous plants.

Herbarium.

The herbarium, which has been on the island for some time, during which it has been used for the Herbarium specimens of indigenous

plants and 41 logs, comprising 39 species of native wo
Many of the specimens and seed are from very rare plant

Experimental Garden, Makiki.

During the first two weeks of the month the men wor
on the road leading to the garden. This work was stop
when we found out that a new road to Tantalus was goin
be built which would pass the garden.

The large boiler that used to be at the Nursery and
taken out about two years ago to allow space for the pre
harness room was carted up to the garden and has been l
in and will be used for a soil sterilizer. This we have l
much in need of for some time. Other work at the Sta
has been blasting and digging out rocks.

Tantalus Forest.

Four days all of the available men have been spent du
the month in beating down and cutting the dead and d
lantana in the forest. The forest is now practically safe f
the danger of fires as most of the lantana that is left is
growing condition and would not burn. If time permits
will endeavor to have it all cut down. The work of cut
and carting away the dead trees from the forest has c
menced and 22 cords have already been cut and stacked.

Forest Station, Nuuanu.

The regular routine work has been done during the mo
by the man employed at the Station. The writer made an
amination of the land at Mr. F. J. Lowrey's place where
Thimble Berry is growing and beg to report that the pl
have not vet been destroyed. With the permission of
Board and Mr. Lowrey I will instruct the man at the Nur
Station to assist in having the Thimble Berry destroyed.
lookout will be kept in case any of the fruit has been car
away by birds and spring up in other parts of the valley.
man at the Station has been notified about this and he
report should he find any around.

Respectfully submitted,

DAVID HAUGHS.
Forest Nurseryman

MOSQUITO POWDER.

Dalmatian or Persian insect powder, familiarly known locally as 'Mosquito powder,' is the dried and pulverized flower buds of a species of chrysanthemum. Its botanical name gives it the name 'Pyrethrum powder,' by which it is generally known in Europe. It occurs wild in Dalmatia and is cultivated extensively in many parts of Southern Europe and also in Asia Minor.

Induced by the high price of Dalmatian insect powder the cultivation of the flowers was introduced into California upon a large scale some years ago and the price soon fell from about one dollar to eight cents per pound. Unfortunately, however, the efficacy of the powder from California grown plants was distinctly below that of European origin and it was not long before the demand for the latter reinstated it in the market and the value of the American product diminished.

The flower heads are sold by the growers to dealers, who dry them and sell them in Venice and Berlin where they are pulverized. It is said that the powder destined for the States is pulverized in London for an American firm whose agent has for some years endeavored to secure the whole Montenegrin output. In consequence of this the price has of late nearly doubled, the powder now being quoted at about fifty cents per pound.

The idea of producing mosquito powder locally is one which should be put in operation. The very large quantities which are burnt in the islands insure a ready sale for our crop if the potency of the flowers is not impaired by their introduction here. Although wishing the proposed industry every success, it is to be hoped that as time goes on those who engage in it will have to seek other markets for the disposal of their product than our own, in consequence of a gradual diminution of the mosquito nuisance. However, the eradication of these pests is not so near as to discourage the making of experimental plantings to determine the value of Hawaiian insect powder. Even when the day arrives that no altars are lighted in our midst to the mosquito, there will be still markets farther afield which will be open to the disposal of an efficacious powder.

CRYSTALLIZED BANANA.

A delicious sweetmeat is prepared from bananas in San Domingo in the following way: Large, thoroughly ripe bananas are skinned, and the fruit is cut into thin slices about one-quarter inch in thickness. These pieces are sprinkled with fine or powdered sugar, and placed in the sun on boards or trays. As the fruit dries, it is turned over several times, and each time dusted with sugar. In a few days it is sufficiently dry, and forms a crystallized conserve of delightful taste.—U. S. Consular Report.

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WATER RESOURCES OF HAWAII.

The following address was delivered Sept. 15, 1909, by Mr. M. O. Leighton, U. S. Geological Survey, before the Commercial Club, Honolulu:

No good business man would operate a mercantile establishment year after year without taking account of stock; no successful manufacturer would sell or contract to deliver a season's product of his factory unless he had a thorough knowledge concerning the supply of raw material entering into that product. These are self-evident truths. Why then should a territory, the bone and sinew of which is made up of hard-headed business men, expect to continue to roll up an immense snowball representing agricultural success, when very little is known concerning the most necessary raw material, namely, water?

This Territory is accustomed to agricultural success, which is the same thing as saying that you have had sugar prosperity. Therefore, when I say that you lack knowledge concerning water supplies, you may be justified in pointing to your sugar crop returns and announcing that you are getting along pretty well without such knowledge. So you are, but can you tell me how much sugar failure you have had because of your lack of that knowledge? How many acres have been abandoned because of lack of water? How many more acres would be planted if water were available? How much greater would have been your annual crops had all the lands a sufficient water supply? You cannot tell; the Planters' Association does not know; no one knows. Of this I am sure, because this question is one of the first that I asked when I came to the Territory. The statistician of the Planters' Association informed me that no attempt had ever been made to gather such information. The fact illustrates one peculiarity that I have noted repeatedly during my visit here. It is that the people here are so accustomed to success that they fail to appreciate the value of failure and of negative results. So it is that no one knows what the sugar failure has been in Hawaii, or at least that portion of it due to ignorance concerning water resources. Yet, in traveling over the Territory, significant cases

occasionally appear. I know, for example, a place where one million dollars was expended in a sugar plantation before they found that the only obstacle to success was lack of water. I know another plantation in which the shortage last year, because of lack of water, was 8,000 tons of sugar, and the prospective shortage for this year will be 10,000 tons. I know another plantation where last year's shortage was 3,000 tons. I have not visited all the plantations. My inquiries concerning losses were necessarily limited to a few. But, taking all these facts and conditions into consideration, it is clear that sugar failure in Hawaii during the average year must be far greater than the casual inquirer would imagine.

I have introduced my subject in this way because it is important that your first impressions of the water resources investigations now being started should be those of a straightforward, rock-bottom, business transaction, worthy of your interest and support as business men.

Even had not the need for information concerning water supplies already been felt in the Territory, the future alone would render an investigation essential. In the development of the agricultural industry here, there has been a fairly large amount of elbow room. Only now and then have you clashed into dispute over water supplies. If one man has not had sufficient water for his crops, the reason has not usually been that some other man is tapping his source of supply. But the Territory is growing. You all expect it to increase manifold in productivity. Every new field imposes a new demand on the available water of the Territory. Questions as to the most beneficial use of water will wax acute. Information concerning the capacity of sources of supply will be worth a millionfold more than the cost of procuring it. The point is, however, that it takes time to procure this information, and if the Territory is caught without it on the day that it becomes essential to industrial progress, then will the people look back with regret on a lost opportunity.

The investigation of water resources now being organized consist of two broad divisions. First, the measurement of river flow; second, the investigation of underground water supply. River flow measurement means the daily observation of amount of water flowing in a stream for a period of years sufficient to determine the habits of the stream and its capacity service. You know that a river will flow sometimes high sometimes low, but unless you have made an investigation, have no idea how many acres it will irrigate during low stages, or how great a volume is wasted into the sea during floods.

In this Territory, you have some unusually good ditch systems. I have rarely seen better, but they do not in any case use their sources of supply with maximum efficiency. Sometimes they run short of water and some of the fields lying under the

must go dry. Again the ditches are full and water is run-
to waste in floods. A flood is essentially a waste of water.

For to intelligently deal with such a situation, it is neces-
sary to know how much water is wasted in floods, how much
can be saved by storage and how many more acres could be irri-
gated from such storage. Finally, all the facts must be assembled
to determine if it is practicable to undertake conservation, and
to what extent. The significance of the underground water
resources is equally great.

The investigation of water resources here involves considera-
tion of many important public problems, some of which are pecu-
liar to this Territory. For example, I hear on every hand, the
desire expressed for a great and stable population that may be
drawn upon for labor, production and defense. To this end
there have been trying to secure immigration of people that would
stay here and become a part of the body politic. A very good
question is upon what are you going to base that citizenship? There
is no sociologic principle more completely demonstrated than that
which requires ownership of land in the making of a citizen.
Without your social remedies, they will fail, they will all fail,
for each man has his feet somewhere in the soil.

I don't mind confessing that I came here with a badly warped
view of things against homesteads in this country. From that which
I have faithfully read and from the testimony of several well-
educated men my preconception was that this land was a place
destined for big estates, to be operated by alien labor, with the
Union flag kept in its place only by the persuasion of rapid
immigration. I am going away convinced that the flag can be kept
here without the constant menace of armament, but sus-
tained by the stout hearts of Americans whose homesteads stand
firm over the land. The best part of this Territory or that
is best suited for homestead entry is the arid part. In fact
there is very little agricultural land here that would not be bene-
fited by irrigation. Now if you are going to dot this arid country
with homesteads, which you *must do* if you succeed in your
effort for a stable population, you must know where the water
is coming from that will support those fields.

Up to a very recent time, your agricultural development has
been one-sided. Before coming here I heard it said that Hawaii
had put all its eggs in one basket. After looking over the situa-
tion I believe it incumbent on all devout citizens of the Terri-
tory to thank the Lord for that one basket. It is a strong, capable

Long may it last. Nevertheless, we must all recognize
the economic necessity of developing other industries that will
serve as a counterweight. In my opinion, it has been proved that
the sugar industry is a plantation industry, one that must be run
on a large scale and that if the homesteader succeeds in cane
growing he does so by reason of the altruism of the neighboring
plantation. In other words, he becomes a plantation adjunct.

Now altruism never made an American who would stand up with his chin out. Therefore in homesteading this country there is furnished the opportunity to build up diversified agricultural industry. Hang on to your sugar, encourage it, do your best for it, because it has carried you through many grievous years. Even if we are so inconceivably foolish as to believe that the sugar industry should be dethroned, it ought to be apparent that this dethronement should not occur until something has been provided to take its place. The best way to help sugar is to fill your Territory up with homesteaders who are producing other things. There is no room for conflict. Sugar lands are sugar lands. They will produce more value in this commodity than in anything else. The homestead lands are not the sugar lands and you will be right in the majority of cases if you suspect the motives of that man who demands a homestead slice out of a growing plantation. The bonafide homesteader can generally find land better suited to his purpose elsewhere.

Now, it is a well known fact that homestead schemes have been tried here repeatedly and have failed. I have visited the scenes of some of those failures, and inasmuch as I am a guest here it would be impolitic for me to express my real opinion of some of them. Others have been well conceived. The one truly successful one that I have seen, that at Kalaheo on Kauai, is the one in which there has been conferred upon the settler the greatest amount of personal risk and independence and the smallest amount of pernicious soup kitchen paternalism. The Kalaheo homesteader pays for what he gets and it is up to him to make good or quit. He has a market, a chance to get his products there at reasonable price, competition, something to lose and something to gain, and these are the conditions that will create an upstanding American.

Among all the deterrent features that have been encountered in successful homesteading, there is one which persists throughout except in the case of Kalaheo. This difficulty is confined not only to homesteads, but indeed to every interest and industry in the Territory. The one great reason why so many thousands of acres of Hawaiian soil remain unproductive at the present time is lack of transportation facilities. You have heard this long ago, but still lack transportation. Until transportation is provided on a par with other parts of the United States and the world, the climate, the soil, a worthy market and all the enormous public spirit of the citizens of this Territory will fail to produce results. Hawaii can produce several distinctive crops that can be raised and claim an exclusive market on the mainland, but the fact is of little value. The homesteader can make very little use of his crops if he cannot get them transported to market at a price which will still allow him a reasonable profit.

The first transportation difficulty is seen in the highway system, although the highways of the Territory are astoundingly

ood, yet they are usually the main highways and do not extend to areas that are most favorable for homesteads. This will be corrected in time, but the fact remains that your highways should go ahead of your homestead settlements.

The second difficulty is the lack of railroads on the islands. Each island should be belted by a well equipped road which sends spurs into the interior, and moreover, the construction of these roads must precede extensive homestead settlement; especially will this be true if the Reclamation Act is extended to these islands. It is not likely that the Federal Government will expend vast sums of money to reclaim homestead lands unless there is guaranteed in some way suitable railroad outlets to harbors. Right here we must face the fact that the bonds of any railroad constructed in advance of traffic or terminal outlets are not saleable at the present time. This difficulty is a practical one so far as railroad construction is concerned, but it does not change in any degree, the necessity for the railroad construction in advance of settlement in this Territory. It is a plain business-like proposition that in order to secure the construction of such roads the interest on the bonds thereof should be guaranteed by the Territory. A socialistic proposition is it not. I grant that it is exceptional, yet in urging exceptional things, I am merely taking my cue from the citizens of this Territory. You are constantly urging that the political and industrial problems of this Territory should not be interpreted from the same point of view as similar problems are in the States. In that contention you are correct, but I contend that the exceptional conditions extend into transportation as they do into everything else. You must have the railroads in advance of traffic. The only way to secure them is to guarantee the interest on the construction bonds.

The third transportation difficulty is the lack of harbors. It costs a heap of money to tranship freight by small boats from shore to steamer. It is a very familiar saying among transportation men that it costs very little to turn the wheels of a car or of a steamship after you have once delivered the freight on board, but the major part of the charge is the transshipment and terminal charge. Harbors are necessary and the steamers should be able to go to docks to receive and discharge their freight. Fewer and better landings, enormous freights, better service and lower charges would result.

The Territory would profit greatly by an increase in inter-island traffic. Productive trade relations should always begin at home. You cannot expect to serve the world markets with diversified products until you are successful in serving each other. You have great home demands which you could supply yourselves but which are now served by imports. The fault does not lie in the lack of productive soil, but in the fact that it is cheaper to serve the local markets with supplies from San Francisco than from your own fields. Transportation is the preventive. The

company that maintains inter-island transport service should have a volume of traffic sufficient to operate at least thirty boats. Railroads on the islands will surely produce such a traffic. This fact has been demonstrated elsewhere so many times that the proposition needs no argument. But in order to accomplish this at an early date your railroads must precede your traffic.

SEATTLE LIVE STOCK SHOW.

Finding the first buildings erected for the live stock show at the Alaska-Yukon-Pacific Exposition, which will be held from September 27 to October 9, completely inadequate to handle the enormous number of animals which have been entered, the department of works at the Exposition has found it necessary to double the size of the barns.

The new structure will be 120 feet in length by 50 feet in width, and it will be completed in time for the opening of the live stock show on September 27. The work is being rushed and a large force of men is now at work.

In all 2,182 animals have been entered by the two hundred and fifty breeders represented. The stock is coming from practically every state of the United States and province of Canada. Many of the breeders have imported the best foreign stock to exhibit in the hopes of drawing down prizes with European animals. In the show there will be 288 horses, 899 cattle, 323 swine, and 872 sheep.

In the horse division, as is usually the case, the Percheron class leads in the number of animals entered with 65. The largest single entry of this celebrated breed is made by A. C. Ruby of Portland, Ore., who will exhibit sixteen, while E. F. Kleinmeier of Los Angeles, Cal., is bringing fifteen from California.

FOREST AREA OF THE SOUTH.

The South, with twenty-seven per cent. of the total area of the United States, contains about forty-two per cent. of the total forest area of the country. This forest must be used, of course, in order to meet the steadily expanding wants of this section. It must be used in such a manner, however, that the very most may be made from its annual cut, while at the same time this cut is being replaced by new growth. In this way its timber will remain a source of perpetual wealth.

The importance of forest conservation to southern interest is clearly understood. The future of the South is more nearly bound up in the plan of forest preservation, with its accompanying protection to watersheds, power-streams, and wood-working industries, than is anything now before the people of that part of the country.

SEATTLE CONSERVATION CONGRESS.

The following paper by Mrs. Augustus F. Knudsen, Delegate of the Woman's National Rivers and Harbors Congress, was read before the First National Conservation Congress at Seattle, Washington, on August 28, 1909:

It is with a deep appreciation of the honor conferred upon me that I heartily thank this dignified body for the invitation extended to me to tell something of the active interest the women of America are taking in this great, far-reaching movement—the conservation of the Nation's natural resources.

It has been said that this is a woman's age, and surely the signs of that fact are not wanting, for within these beautiful grounds are still echoing, one might say, the stirring words of eloquence and power of some of the foremost women of the world—who in the last few weeks, have stood upon this platform, women who have journeyed not only from distant states of our own nation, but from capitals of Europe, to discuss the great questions of the day, and to contribute by combined effort to the uplifting of humanity.

It is woman's place in nature to stimulate man to his best efforts. She has ever led him on to higher things. For her sake—for home and happiness, he undertook to subdue the wilderness, and so for generation after generation, our civilization has grown out of the Teutonic forests, to our splendid great attainment.

Just as the wives and mothers in this great western march of civilization have stood shoulder to shoulder with the men in their struggle for material conquest in their advance through Europe and England, just so have the women stood the physical hardships, privations, and dangers with the men as they have journeyed on with the spread of that same civilization through America and the Islands of the Pacific. As the women in the western advance have by their loyalty and devotion made it possible for the men to subdue nature and make a mighty nation, just so shall the women stand as companions and helpmates in the great questions that demand their most earnest thought and considerations—questions that will affect not only the present but the future prosperity of our fair land.

Without taking into consideration, in these councils of the nations, the result of women's influence, man will be as far from the final solution as was the frontier man far from home, before woman came to help him in his struggles.

The march of civilization westward was the arrival of woman on the scene. The mark of our highest civilization along mental and spiritual lines is when the women of the land are able to grasp the conditions confronting the nation, and by their co-operation with men, give them sympathy and help in their undertakings, never doubting men's ability to achieve.

The world is growing better. The strongest proof of this fact is that the women of this time are responding to the crying needs of the nation. Laying aside the conventions and traditions that have bound them since time began, they are glad to stand as help-mates to men who are working for the good of this great land. In no national movement has there been such a spontaneous and universal response from women as in this great question of conservation. Women from Maine to the most western shore of the Hawaiian Islands are alive to the situation. Because, the home is woman's domain. She is the conservator of the race. Whatever affects the home, affects the very life of the nation. So, women with that feminine sense of caring for and protecting all that is sacred to them are ready to join heart and soul, in the work of adding to the security and prosperity of their cherished possessions.

In far distant Hawaii while sojourning in the mountains of the beautiful Island of Kauai, far from the struggles and cares of the great centers of our Nation, a call came to me from Louisiana to join a small band of women organized to coöperate with the men in their noble efforts to preserve the Nation's resources.

This organization was formed in Shreveport, Louisiana. The Hon. Joseph E. Ransdell, President of the National Rivers and Harbors Congress, realizing that woman's enthusiasm and zeal are strong factors in bringing about desired results, urged the women of Shreveport to form a Woman's National Rivers and Harbors Congress, to work in coöperation with the Men's Congress. A ready response was found in the minds and hearts of the women of Shreveport, who know only too well the waste and desolation caused by the Mississippi. An organization was formed. The presiding officer chosen is Mrs. Hoyle Tomkies, a refined and cultivated woman, whose enthusiasm has set aglow the hearts of many women from Maine to Hawaii, to work in this great, comprehensive cause.

At the first convention of the Woman's National Rivers and Harbors Congress, held December 9, 10, 11, in Washington, D. C., there were about twenty states represented, and after the interesting sessions, each woman delegate returned to her respective state with the intense desire to arouse the women to be up and doing in this splendid work, by talking conservation, by coming into the organization, by educating the children to the responsibility that will soon be theirs in saving and conserving their country's natural resources. At this convention some of the strongest members of Women's National and State Clubs lent their influence.

Active work for bringing the idea of this organization to the women of Hawaii was taken up early in March. The Woman's College Club of Hawaii, consisting of about 150 members, called a meeting of Honolulu's representative women at the home of Governor and Mrs. Frear. At that initial meeting, after the

message had been given, the audience was addressed also by Governor Frear, Judge Dole, and the Bishop of Hawaii, on the subject so vital to the Territory. After the meeting, fifty women enrolled as members. Since that first meeting until April 17, the message had been carried personally to sixty teachers, eight hundred school children in Honolulu—the result being that the membership had grown to about three hundred individual members; a Conservation Club formed in the Normal School of the two higher classes, which came into the Woman's National Rivers and Harbors Congress as an organization and had planned active work for the summer, viz: to commence to re-forest a picturesque old land mark, Punchbowl. The local chapter of the Daughters of the American Revolution have come into the organization, and to show their interest, they have offered a prize to the two high schools for the best essay on Conservation. Besides this personal work in Honolulu, a written message was sent to every teacher in the whole Territory of Hawaii.

To bring this matter educationally among the women of the Islands, there have been instituted quarterly meetings at which papers are read by women who have acquainted themselves with their chosen subject, thus giving others the benefit of their study.

In Hilo, situated on the island famous for the active volcano, is a large membership, and the women are doing practical work in forestry.

During the last year while this work has been going on in far away Hawaii, active work has been going on throughout the Nation. A recent report by Mrs. Tomkies, the National President, shows that organized less than eleven months ago with seven members, the Woman's National Rivers and Harbors Congress has grown to a strength of over twenty thousand members.

To the women here present—to the women of the City of Seattle and the State of Washington, I bring the greetings of the Woman's National Rivers and Harbors Congress, with the earnest hope that you will become members of the organization, and as such, create a public sentiment for all that Conservation means.

We women of America can be of great help in not only adding to our Nation's present prosperity, but in handing down to our children's children a land rich in beauty, in agriculture, and in commerce—a land in which is destined to be found the highest human expression of mental and spiritual power.

Probably during no time in the history of the islands have so many activities been in operation to disseminate knowledge of Hawaii and to bring its attractions before the mainland public. The immense popularity of the Seattle exhibit, the promotion of island interests at the Spokane and Denver Congresses, the recent visit of the Congressional party and of the fleet, form a combination of advertising mediums which, falling together, will prove an incalculable impetus to island affairs.

BOARD OF COMMISSIONERS OF AGRICULTURE
AND FORESTRY.

Division of Entomology.

REPORT OF THE SUPERINTENDENT OF ENTO-
MOLOGY FOR JULY, 1909.

Honolulu, Hawaii, August 1, 1909.

Honorable Board of Commissioners of
Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen: I beg to report herewith on the work of the
Division of Entomology during the month of July:

HONOLULU INSPECTION.

Of 31 vessels boarded we found live vegetable matter on 17.
This received the usual rigid inspection and was treated in the
following manner:

<i>Disposal with Principal Causes.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	980	10,320
Refused landing	2	112
Fumigated before releasing.....	10	15
Burned	12	85
Total examined	1,004	10,532

Possible Pests Intercepted.—It is difficult to point out with cer-
tainty which of a collection of possible pests would have proven
the more destructive were it not held up. Upon mango seeds
from Manila we collected living caterpillars and pupae of an
unknown moth. But our richest harvest we gathered in a lot of
orchids from the same region. There were scores of live snout
beetles, cockroaches, spiders, pill bugs, scale bugs, scorpions.
Diseased yams from the Orient received merited treatment, and
wormy peaches and apples were refused landing.

MAHUKONA INSPECTION.

On the 10th I received word from Mr. R. R. Elgin, our Honor-
ary Inspector at that port, announcing the arrival of vegetables
per the “James H. Bruce” for the Hawaiian Mercantile Company
of Kohala. He submitted samples for inspection. After con-
sultation with Mr. Waterhouse of the Entomological Committee
(Mr. Dowsett was not in his office), Mr. Elgin was advised by

wireless to release the shipment, which was passed here. As the Hawaiian Mercantile Company wished to import only potatoes, onions and garlic, Mr. Elgin was given instruction in our methods of inspecting these vegetables, samples of diseased potatoes having been also sent him.

HILO INSPECTION.

Reporting on his work in Hilo, Bro. Matthias writes as follows:

"The following is an account for June and July. There were 15 foreign vessels, 160 lots and 2,375 parcels. All were allowed to pass, only a few plants needed treatment on account of insects.

"Several hundred crates of pineapples were shipped to the coast in June. The pines were duly and successfully fumigated here in Hilo. I examined the pines carefully the day after, and found that all insects on them were dead. Thousands of dead insects were found on the floor of the compartment in which they were fumigated. I gave a certificate to that effect which, however, was ignored by the inspectors in San Francisco. The pineapples were again fumigated by them at the expense of the shippers. The charges were twenty-five cents per crate, but finally came down fifteen cents; in all seventy-six dollars, which was rather hard on the Hilo men.

"The public in general seem to have strange notions as regards the inspection work. The general idea seems to prevail that everything is subjected to vigorous fumigation with fire and brimstone.

"If imported seeds do not sprout, they were spoiled by the fumes; if fruits do not taste well, it is for the same reason; if plants come dead through the mail, they were burned by the fiery blast.

"The fact is that fumigating is seldom resorted to.

"During my three years work in Hilo, many thousand boxes of fruit passed the inspection, and of these, only thirty-seven boxes were fumigated,—twenty-five boxes of apples, ten of lemons, and two of oranges.

"Seeds are never fumigated for if they are infested with pests they are simply destroyed and the consignee notified.

"The shippers in San Francisco are rather careful in selecting the fruits they send to Hilo for they know that they have to pass inspection, and besides the importers never fail to remind them of the fact.

"Plants and vegetables are more liable to have injurious insects on them and in consequence have to be fumigated at times.

"No heat, however, enters into the affair and the gas used does not leave evil results.

"I have fumigated very delicate plants and flowers just for

experiment sake, and found that after fumigating they were just as fresh as before."

WORK WITH USEFUL INSECTS.

Three lots of horn fly enemies collected in Germany were received from Mr. Koebele during the month and turned over to Mr. Swezey of the Planters' Experiment Station.

Melon Fly Parasites.—To Mr. Swezey were turned over also the fruit fly parasites upon arrival from Australia on June 24th. His report I beg to submit herewith. Although written in August his work of breeding was finished in July. Briefly summarized it is to the effect that neither of the two parasites bred showed inclination to oviposit in our melon fly larvae or pupae. A few fruit flies were the first to issue and were allowed to die in the tubes before removal. The most interesting were the small, dark flies that issued in comparatively large numbers, 115 in all. This is apparently the species in which the West Australian entomologists repose much of their hopes, probably *Tetrastichodes* as identified by Dr. Perkins from specimens left by Mr. Compere last year. Although given every possible opportunity they failed either to mate or attack our melon fly maggots. The development of melon flies instead of parasites from these maggots conclusively proved this failure.

Seven specimens of an Ichneumon fly were also bred, but, says Mr. Swezey, "only in one instance were there healthy specimens of both sexes present at the same time." These two were short lived and failed to either mate or attack our melon fly maggots, this having also been substantiated as above. Our thanks are nevertheless due Mr. Compere for sending the insects and Mr. Swezey for the great pains he took with the work of breeding. I should recommend to the Board to endeavor and secure another colony from West Australia. In any event not to let up on the work of relieving the country of the melon fly pest until it is crowned with success.

Disinfection of Abandoned Cucumber Field.—In accordance with instructions from the Board on the 7th, I took some of the nursery men to the field on the 10th and, after careful raking up of the field and pouring oil on the heap, had it set on fire. This cleared that field of myriads of the pest that would have otherwise bred out and scattered to all the corners of the island. Mr. Geo. Fairchild, who I was informed is one of the owners of the estate, was advised of our action.

Rust on Brake Fern (*Pteris aquilina*).—At the request of Mr. L. von Tempsky I secured for him identification of the rust attacking it. He first observed this rust in form of white dust rising from the fern from under his horse's feet when he drove through it. I am informed by Mr. Lewton-Brain, our honorary plant pathologist, that "this fern rust (*Uredo polypodii*) is quite

destructive to the majority of ferns, but will not attack flowering plants." Mr. von Tempsky was so advised.

Algaroba Caterpillar.—In accordance with your instructions to investigate immediately the alleged destruction of algaroba flowers by a caterpillar I devoted time to observation of these flowers in the vicinity of my home and office as well as during collecting excursions on Sundays. I also enlisted the coöperation of some of my colleagues in the other offices, and have besides questioned people directly concerned in the bean crop. The conclusions I draw from all these sources is that the dark caterpillar, the particular one referred to as occurring so numerously, feed largely if not entirely on dead, defunct flowers. It has been repeatedly observed among old flowers of algaroba, coffee, mango, etc. Because mealy bugs often hide in similar locations, the caterpillar was by some supposed to be feeding on these. Because of this habit Mr. Swezey proposes to call it *omnivora*. The bean crop, wherever observed, seems to be generous, and finally I was informed by a botanist that the catkin normally loses most of its flowers. There is accordingly, at least so far, no reason to expect serious damage from this caterpillar. The variety of bean weevils attacking the pods is more serious, so that Dr. Wilcox's work on parasites of these is timely and very welcome. Mr. Renear's bean grinding machine should also help keep these weevils down.

Plant Pest.—Specimens of the erroneously called "German Ivy" (*Senecio mikanioides*), a well known pest on the Parker Ranch, Hawaii, were brought to the office badly infested by a bug. Mr. Kirkaldy kindly identified the animal as *Nysius* sp., but extends no hope that it will damage the "Ivy" to any extent.

By leave of the President, Mr. Kuhns, the inspector's assistant, was absent on Maui from the 17th to the 23d of the month. Mr. Robert Miller, the temporary assistant in inspection, was relieved from duty on the last of the month and Mr. L. Lewis engaged in his place.

At the request of Mr. Blackman I undertook to edit the "For-ester" for August. For this purpose I made good use of Dr. Silvestri's paper on our entomological work, which we had translated from the Italian. This paper being rather lengthy, the number will be almost wholly entomological. It will be a very interesting number and efforts will be made to have it read widely.

Very respectfully,

JACOB KOTINSKY,
Superintendent of Entomology.

REPORT OF THE SUPERINTENDENT OF ENTOMOLOGY FOR AUGUST.

Honolulu, Hawaii, August 31, 1909.

Honorable Board of Commissioners of
Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen: I beg to report herewith on the work of the
Division of Entomology during the month of August:
INSPECTION.

We boarded 28 vessels and examined matter brought by 21 of them. Our examination resulted as follows:

<i>Disposal with Principal Causes.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	661	13,754
Refused landing	1	3
Fumigated before releasing	3	6
Burned	14	61
	679	13,824
Total examined	679	13,824

The most important things held up were an unknown white fly (*Aleyrodes*) on potted clover from California; alligator pear mealy bug (*Pseudococcus nipae*) on *Kentia belmoreana* from an Ohio greenhouse; finally, Lepidopterous and other larvae in mango seeds from Manila.

This is the season when many of the peaches imported are badly infested with the caterpillar of the peach twig-moth (*Anarsia lineatella*), and to guard against their importation we either refused landing to such fruit or picked it over, burning those infested. This saved merchants from total loss.

In view of the terrible loss fruit flies inflict on fruits in Australia, your regulation prohibiting the importation of fruit from that region, whether in large lots or small ones, is strictly enforced.

HILO INSPECTION.

On his work in Hilo, Bro. M. Newell writes as follows:

Report for August.

Eight foreign vessels, 125 lots, 1,646 parcels.

Wormy fruit was unusually rare. A few cases of fruit were thrown away, having arrived in bad condition.

Some River spuds were again imported, but being free from soil were allowed to pass. The importers were, however, reminded of the fact that it is a risky thing to import the articles, and they will have to abide by the consequences.

That apples, pears, cherries, plums, etc., could be successfully grown on these Islands, was a point of which I was never convinced. Last week, however, I changed my mind. At a place called Keanakolu, on the slope of Mouna Kea, at an elevation of 6,000 feet, I saw an orchard of these fruits. The branches were actually bending to the ground under the loads they carried. Apples and pears were especially fine, though not yet fully ripe. Cherries and some other fruits were already out of season. It was a beautiful sight, and reminded one of a California orchard. Considering that the trees are left to take care of themselves it is surprising that there should be so much fruit. The trees were planted twenty years ago, I was told, but are still in healthy condition. The only care taken is, to have the place fenced. Though I gave the fruit a careful examination, not a single wormy fruit could be found.

The mynah bird seems to be the only enemy of the fruit up there, but this pest could be easily and effectually inoculated with a good shotgun.

As previously reported, algaroba beans, if allowed to remain in storage any length of time, deteriorate owing to the activity of two or three species of bean weevils. One of these, the largest, with very much thickened hind legs, was supposed to be a new arrival. I am informed by a careful observer, Mr. G. A. Jordan, that it is not, that he has known it for years, though it may not yet have been distributed to all the islands. To help keep it confined to Oahu as long as possible we fumigated 225 sacks of these beans with carbon bisulfide ("high life") before shipment to the Bishop Estate in Kona. We also fumigated a lot of ornamental and fruit plants shipped to Tahiti. It is my belief that the uniform practice of fumigating *everything* shipped from the government nursery would be a wise institution. Quite a series of insects now known to be on Oahu only, would thus perhaps remain indefinitely confined to this island.

From Mr. Koebele we received a large lot of boxes with horn fly enemies. Mr. Fullaway, entomologist at the Federal Station, received a parcel of parasitized bean weevils which that station is importing for the sake of the parasites. The senders of these do not apparently realize the great responsibility involved when they do not take the utmost precaution against breakage en route.

With the departure of Mr. Van Dine the inspection of imported bees devolved upon me. Fortunately the two lots that came under our observation were consigned to men that could be relied upon to carry out instructions. Accordingly, after consulting Mr. Waterhouse, they were turned over to them with instructions to burn all but the queen bee. In one instance this was done under our direct observation.

MISCELLANEOUS.

Much of my own time during the month was taken with the

preparation of the MS. for and editing the current Forester. It is out now and promises to do much useful propaganda. Dr. Silvestri's survey of economic entomology as practiced here and the rest of the Union occupies most of the number, which is labeled "Entomological Number," and gives us full credit. In a recent letter Dr. Silvestri writes interestingly as follows: "I have great admiration for the work of the Hawaiian entomologists and I think that the best plan for controlling insects is that used there and I think also that no nation has done so much in very (genuine?) economic entomology than (as) the Hawaiian Islands. I have no reason at present to (ex) change my expressed opinion."

Very respectfully,

JACOB KOTINSKY,
Superintendent of Entomology.

EXPERIMENT STATION, H. S. P. A.

Division of Entomology.

Honolulu, August 11, 1909.

Mr. Jacob Kotinsky,
Superintendent, Division of Entomology,
Bureau of Agriculture and Forestry,
Honolulu, T. H.

DEAR SIR:—I beg to report as follows on the breeding of *Dacus* parasites from the material you received from Mr. Compere, and handed over to me to attend to:

Received on June 24, 1909, a small box containing several hundred supposed-to-be parasitized puparia of *Ceratitis capitata*, in sand, the lower part of the box being packed with damp moss. The box had been in cool chamber in transit from Australia.

After a few days a very few specimens of *Ceratitis* emerged.

Chalcids (probably *Tetrastichodes* sp., as identified by Dr. Perkins from dead specimens left by Mr. Compere last year) emerged as follows:

June 30.....	6 specimens
July 2.....	12 "
" 3.....	14 "
" 6.....	45 "
" 7.....	15 "
" 8.....	15 "
" 9.....	8 "
<hr/>	
Total	115 "

Those which emerged each day were placed in a breeding jar with cucumbers infested with maggots, of various ages, of *Dacus*

cucurbitae, with the exception of the first lot, which were placed with freshly formed puparia of *Dacus cucurbitae*.

In all cases the chalcids lived but a few days. No pairing was observed at any time although both sexes were present; neither was any oviposition noticed. In due course of time the *Dacus* maggots pupated, and flies emerged therefrom after an interval of about ten to twelve days. In no case were any of them parasitized. The result being a complete failure to breed this parasite on *Dacus cucurbitae*, although it was given the best of opportunity.

Specimens of a Braconid (*Apodesmia* sp., according to Dr. Perkins' identification of dead specimens left by Mr. Compere last year) bred out as follows:

July 2.....	1 male
" 3.....	1 female
" 6.....	2 "
" 8.....	1 "
" 9.....	2 males
<hr/>	
Total	7

Whenever any emerged they were placed in a breeding jar with cucumbers infested with maggots of *Dacus cucurbitae*. They only lived a few days, so that only in one instance were there healthy specimens of both sexes present at the same time (one or two were cripples). No pairing was noticed nor any attempts at oviposition.

In due time adult *Dacus* specimens emerged from the puparia which had been formed. None of the puparia were parasitized.

Yours very truly,

(S.) OTTO H. SWEZEY,
Assistant Entomologist.

THE TANTALUS FOREST.

The beating down and removal of the lantana undergrowth from the Tantalus forests has made a marked beneficial appearance of this delightful resort. Hitherto it has been impossible to leave the beaten trails, which have been shut in by a impenetrable tangle of thorns, which have obstructed the views and shut out the longed-for breeze. Now, however, these hindrances to the enjoyment of our accessible forests have been removed. On all sides are to be seen delightful vistas through the tall eucalyptus among which the trades have welcome play. As soon as the public realizes the vast improvement which has taken place on the slopes of Tantalus the forests there should become popular with picnicians and lovers of nature.

CONSERVATION AND THE LAW.

No inconsiderable space in newspapers and magazines on the mainland is at present being devoted to the consideration of the methods of which the natural resources remaining in the control of the nation shall be developed and used. Differences of opinion and varying points of view have made it appear that a fight is on, and so there is. But it is not, as some of the dispatches would seem to indicate, a dispute between individuals. It is rather a trying out of whether the rights of the people shall prevail against corporate greed. This is the real issue, and the one that must not be lost sight of.

It is only natural that with the interest centering on men of strong personality like Mr. Pinchot, Secretary Ballinger, ex-Secretary Garfield, and Mr. Newell, newspaper men, recognizing the dramatic value of the situation, should magnify the personal element in the controversy, the more so as the leading figures may well serve as embodiments of the ideas for which they stand. It is not surprising, too, that the main question should at times be obscured by local differences of opinion of minor importance. But the real question at issue—the vital point—is not of differences between men. It is whether the remaining natural resources belonging to the nation, necessary as they are to the health and life of the common people, shall be legitimately developed and exploited in the interest of all the people, or whether they shall be so disposed of today that, sooner or later, they could fall into the ownership of great corporations that, controlling the situation, could in the end exact a crushing tribute from all except the favored few in control.

Whatever may be claimed, it is the truth—to take but one instance—that if the absorption of water powers by private owners is allowed to go on unchecked, the time will come, sooner or later, when there will be made possible a combine that could levy tribute on the people to a degree beside which the exactions of the Standard Oil Company would pale into insignificance. It is this possibility rather than any provable certainty that animates the underlying principles of what have come to be known as the "Roosevelt conservation policies."

At the Seventeenth National Irrigation Congress, held a few weeks since at Spokane, Washington, Mr. Pinchot clearly outlined the position of the conservationists in a carefully-prepared speech that embodies the policies that for a number of years he has consistently advocated.

The essence of conservation has recently been summed up, through the addition to a time-honored phrase of a few new and illuminating words, to be "the greatest good of the greatest number for the longest time." The underlying principles which conservationists believe will bring this about, are that the natural resources still owned by the people should be exploited without

unnecessary waste for the benefit of the people, as soon as needed, even if used up in the near future. Such exploitation should be by private individuals or corporations with sure safeguards against waste or harmful monopoly. Private exploiters should have conditions of time, charges, et cetera, so arranged that they can reimburse themselves and make a reasonably high profit. Under no circumstances, however, should renewable resources, such as grazing, timber and water, be turned over to private ownership for a time longer than ample to encourage speedy and profitable exploitation.

To these practical principles may be added a few legal principles, to-wit: New laws should be enacted, if necessary, to secure the above practical results. No existing law should be construed other than as it reads; but the Executive is legally and constitutionally the steward of the people's property and should give preference to a construction of the law which will conserve the public good rather than a construction which will help out private greed. If the Executive errs in such construction, he is open to correction, by the courts if a proper case comes before them, or by Congress through amendments so clearly showing their intent that the Executive does not need to construe the law.

In either case, the Executive, being authoritatively corrected, will administer the law accordingly. The President has the power and duty to hold parts of the public land and resources temporarily away from private acquisition, either for public use—as military, lighthouse, Indian reserves, et cetera—or to prevent its harmful loss or deterioration until Congress can be informed concerning the state of the Union in respect to such land or resources—as coal land, power site and other similar withdrawals. This has been clearly decided by the Supreme Court.

Whether or not these principles shall prevail as against the control in perpetuity by private corporations of the water powers, the coal, the minerals, the grazing lands and the forests still remaining in public ownership, is the real question to be decided. It is the one not to be lost sight of in the conflicting statements of individuals, the personal mistakes of advocates, however well intentioned, or in the eddies of side issues that in many cases are introduced purposely to distract attention from the main question. The real fight is between the interests of the people and the greed of the corporations. It is for the people to know the issue and to assert their rights.—*Sunday Advertiser*, Sept. 9, 1909.

A PROMISING MANGO.

The Yearbook of the Department of Agriculture for 1908 contains some excellent colored illustrations of promising new fruits. Of these the Peters Mango, an East Indian variety, is of sufficient merit to warrant general planting. The Peters does well in dry districts which should commend it to certain parts of the islands.

CONSERVATION IN HAWAII.

ITS PRESENT STATUS AND ITS AIMS.

An address delivered before the Hawaii Branch of the Woman's National Rivers and Harbors Congress, September 22, 1909, by Ralph S. Hosmer, Chairman of the Territorial Conservation Commission of Hawaii:

Within the past eighteen months Conservation has become a household word in Hawaii. For some years the people of these islands have been familiar with the general principles underlying the movement, through seeing them in actual operation. But it is only of late that there has come to be realized in its true value the relation that exists between a right use of the natural resources and the sustained economic prosperity of the Territory. It is not necessary before this audience for me to define what is meant by the term Conservation, nor to elaborate upon the principles that underlie the movement. But in a movement that has developed so rapidly and has so many ramifications as has Conservation, it is not always easy to keep accurate track of just what has taken place. Consequently we are justified in stopping now and then to look about us to see what progress is being made. One of the essential features of the movement for the right use of the natural resources is the taking of stock—the finding out of just what our resources are, that we may make wise plans for their development and exploitation. The purpose of this paper is to take stock of what is now being done in this Territory to bring about a wider and fuller and better use of some of our local sources of material wealth and briefly to call to mind what the final objects are toward which our efforts are directed.

The most significant recent step in the progress of Conservation in Hawaii was the enactment last March by the Territorial Legislature of the law authorizing a special income tax “to promote the conservation of the natural resources of the Territory through immigration and other means.” Primarily an immigration measure, this law, Act 33 of the Session Laws of 1909, provides that a tax of two per cent. in addition to the existing income tax, shall be levied on all incomes over \$4,000. Three-fourths of the money so derived is to be used for “the encouragement of immigration to the Territory of Hawaii in aid and development of the agricultural resources and conditions”; one-fourth for “the development, conservation, improvement and utilization of the natural resources of the Territory.” A subsequent act provided that to this fund shall be charged the expenditures made on account of the work carried on by the Territorial Board of Agriculture and Forestry, the aid to the Hawaii Experiment Station, and the money set apart for hydrographic and topographic surveys of the islands, to be undertaken by experts from the U. S. Geological Survey. By transferring the appropriations for these departments to this special fund the ad-

antage was secured of reducing somewhat the regular budget and thereby increasing the amount available for other departments. It is not yet apparent just how much this special income tax will yield, but it seems probable that the allotments for the several existing bureaus just named will be somewhat greater than in the past. The provision for the hydrographic and topographic surveys is, of course, a new item.

From a conservation standpoint the important feature of this Act is that provision is here made for the first time for a start in the systematic study of the water problems of the Territory and the accurate mapping of the semi-arid lands. Both of these are essential prerequisites to any far-reaching plans for the development and ultimate settlement of these areas. The passage of this law makes it possible to follow up the recommendations of Mr. F. H. Newell, contained in his masterly report entitled, 'Hawaii—its natural resources and opportunities for home-making.' This report, it will be remembered, is the outcome of a trip to the islands made by Mr. Newell last autumn, by direction of the then Secretary of the Interior, Hon. James R. Garfield. It is emphatic evidence of the value of getting influential Government officials to visit the islands. Mr. Newell was detailed to come here almost immediately on Secretary Garfield's return.

Parenthetically, let me here urge all those who have not yet read Mr. Newell's report to lose no time in getting a copy and becoming familiar with it. The Promotion Committee has it for distribution. Copies may be had free upon application.

Regarding the work now actually under way Mr. Mendenhall will speak to you in detail of the investigations that Mr. Leighton and he have in hand. Enough for me to say that the work started by them is the beginning of one of the most important steps toward the reclamation through irrigation of considerable areas of semi-arid land throughout the Territory. Without water these lands are of comparatively low value. With water they will not only become highly productive, but rightly handled can be made the basis for American homes. And this is the ultimate object—the goal toward which all conservation work, both here and on the mainland, is directed—the making possible of homes for the people.

It has so often been said that what Hawaii needs is more American settlers that the statement tends to become trite through repetition. But it is none the less true. Because of the very fact of its isolated geographic position there are put upon this Territory by the Nation certain duties. These can most efficiently be performed only when there is present in Hawaii a vigorous, self-reliant American community, of sufficient numerical size to control the local situation. From the standpoints of military necessity, commercial development and social betterment it is alike essential that there be an increase in Hawaii in the number of American homes.

There is no possible question of the desirability of getting such people, but the mere desire for settlers does not put them on the land. Many attempts to get permanent settlers have been made in the past with varying degrees of success. Based largely on the findings of Mr. Newell and the recommendations in his report, it now appears that perhaps the most practicable way to bring about conditions that would make it possible to attract and secure the sort of home-makers we need, is through the extension to Hawaii of the benefits of the Federal Reclamation Act. Under this law it appears possible to reclaim considerable areas of semi-arid public land on each of the larger islands, through irrigation. The Territory has already gone nearly to the limit of its resources in its attempt to develop the islands along traditional American lines. The burden of taxation has now almost reached the breaking point. The reclamation of the semi-arid lands is too big and expensive a task for this community to tackle alone. The time has come when aid must be sought from some outside source. A practicable solution is presented in the extension to Hawaii of the Federal Reclamation Act of June 17, 1902. The investigations now under way mark the path for further advances. Therefore it should be the pleasure of all large-minded citizens, as it is the duty of Territorial officials, to help on a movement that means so much for the future of Hawaii.

The Reclamation Act provides for a revolving fund—started originally by receipt from the sale of public lands, whereby areas of potentially arable lands throughout the West may be reclaimed through irrigation and transformed into home supporting farms. Its operation is limited to the States and Territories west of the 99th meridian, but including Texas, to which State the Reclamation Act was extended by special act of Congress three years ago. As a full fledged Territory, having considerable areas of irrigable public land, it is the claim of Hawaii that she is justly to be considered an "irrigation state" and consequently entitled to the benefits of the Reclamation Act.

To secure the extension of this law to Hawaii requires an act of Congress. Favorable action by Congress in any given measure is usually the result of strong and aggressive support. In a project like this little can be hoped for without the assistance of friends on the mainland. Especially desirable is the endorsement of great popular associations, for often the real wishes of the people are best expressed in this way. This is particularly true of the National Irrigation Congress, whose recommendations carry great weight in all matters pertaining to irrigation. The National Irrigation Congress, now in its eighteenth year, is made up of representatives of all the leading irrigation institutions throughout the country,—states, cities, national and local associations, water companies and interested individuals. It is a powerful and thoroughly representative organization. Recognizing this, the Territory of Hawaii was this year represented at the

eting of the Congress held at Spokane by a delegation of six members. The aim of the delegation was to press the claims of Hawaii and to secure the endorsement by the Congress of the project to extend the Reclamation Act to this Territory. In this quest we were successful. The resolutions adopted by the Seventeenth National Irrigation Congress contain, among other recommendations, this clause: "We urge the Congress of the United States to extend the Reclamation Act to the Territory of Hawaii."

Similar favorable action was also secured at the First National Conservation Congress, held at Seattle, August 26-28, where one of the resolutions adopted was in favor of this project.

One other point gained may also be noted in this connection. Largely through the active interest and influence of Mr. F. H. Newell, representatives of Hawaii were given an opportunity in Seattle to appear before the Senate Committee on Arid Lands, then en route on a tour of the West to investigate various reclamation projects. It is before this committee that the bill to extend the Reclamation Act to Hawaii, introduced at the last session of Congress by Prince Kuhio is now awaiting consideration. The committee listened with apparent interest to a presentation of statements in favor of Hawaii's contention, following which briefs were filed giving the arguments at greater length.

These are all steps in the right direction and properly followed up should be of no small help in bringing about the desired result. But it is only the beginning. To be successful the campaign must be unceasingly waged until the object Hawaii desires is secured. One of the reasons why we were successful at Spokane and Seattle was that we knew precisely what we wanted and went after that one thing. What is needed now is that the points gained so far be followed up. We have a law enabling the Territory to coöperate with the Federal Government by beginning a study of the local problems. Water experts are already on the ground. Other experts are on their way here to ascertain the exact situation and need in the way of maps. What is wanted now is a better understanding by the general public of the reason for these investigations and the end toward which they lead. It cannot too often be said that the final goal—the essential purpose of all Conservation work, here or on the mainland, is the making possible of more American homes. An enlightened public sentiment helps tremendously in backing up such work and keeping it going. Much local interest already exists. This interest will increase when the people know more about what is intended and what is being done. The diffusion of such information is peculiarly the duty of such an organization as this. The members of the Hawaii Branch of the Woman's National Rivers and Harbors Congress can do no more useful work than by posting themselves accurately on this subject and then passing the word along.

Over in the Pacific Northwest one of the best of the many

local catch phrases is, I think, that of Walla Walla: "What Walla Walla wants is YOU." What Hawaii needs is that we all get together and work to bring about such a condition of things that we can stand on an even footing with our friends on the mainland and be able to offer to prospective settlers an equally good, if not a better chance in Hawaii nei. Unfortunately we cannot do that now. Economic conditions here are not yet ripe for the immediate influx of a large number of American settlers. But through the intelligent, consistent and continued application of the principles of Conservation, backed up by an ever-increasing public sentiment, Hawaii may one day hope to be equipped adequately to play the part that unquestionably waits for her in the great world drama of the Development of the Pacific.

THE TERRITORIAL WATER SUPPLY.

Address delivered before the Hawaii Branch of the Woman's National Rivers and Harbors Congress, September 22, 1909, by W. C. Mendenhall:

"The term 'Conservation,' unknown except in limited circles five years ago, is now on every tongue. The national movement for which that term stands was unheard of by the general public before the Roosevelt regime. If by accident its quiet although sturdy beginning came to the attention of our 'practical' statesman, it was regarded as one of the infinite number of U'topian schemes born each decade and dying at birth. But this movement, founded on a wise foresight; standing for the application in national affairs, and to natural resources, of the simple principle which every business man applies in his own business affairs, and by which every wise housekeeper uses in the management of her own household; made instant appeal to the common sense of each individual who came to understand it; and so, from an obscure movement without influential support, it sprang under the vigorous championship of Theodore Roosevelt and his friend, Gifford Pinchot, into national prominence and quickly became a great national issue. Five years ago our lawmakers had not heard of it, or having heard of it, ignored it; now they recognize it as a force with which they must deal and its supporters as an active body of practical idealists who *will* be heard. The question is no longer one as to whether conservation on the whole is wise, or whether the movement is to go forward at all, but rather as to how rapidly its tenets shall be enforced, how many of its principles shall go into effect now and how many of it were better to postpone until public sentiment is riper or until business interests shall have adjusted themselves to the swiftly changing public attitude toward the rapid exploitation of irreplaceable natural resources. The change in sentiment in this respect is already great. Certain masters of industry, not long ago, regarded as models of

prise, because of their rapid accumulation of wealth through exploitation of forests, coal, oil and gas, phosphates or water resources, now to their great bewilderment, find themselves looked upon with serious suspicion. It is no longer regarded as good citizenship to sacrifice ruthlessly the interests of future generations in order that wealth may be accumulated in this. The manager of a great coal or lumber company, who has taken pride in creating an industry, building up a community and accumulating wealth for himself and his associates and too much engaged or too careless to watch the trend of public opinion is suddenly some day into an amazed and resentful consciousness of the changed public attitude toward himself and his enterprise. What the coal or the lumber to use he says? Is it not perfectly legitimate to create wealth by an exploitation of these resources, the possession of which the nation is so fortunate? Suppose they leave a path of destruction behind him. Future generations can take care of themselves, as this generation must. Is he reaping but the legitimate reward of his foresight and enterprise in acquiring these great bodies of coal and oil, timber and phosphate? Are they not his own? Whose business is it anyhow he mines or how he cuts his lumber? Of course he does it in the way that yields the largest returns. That's what he is in business for. Fifty per cent. of the coal wasted? All the young undergrowth killed? Well, that's because it doesn't pay to save it. You don't expect him to waste his own and his shareholders' money in outlays that bring no return do you? So he fumes and fumes. He has not changed, but his standing in the community has. It is irritating beyond understanding. He can even be threatened with indictment because it is found that he has acquired his large holdings of coal or of timber in the wrong way by using dummy entrymen. He, the most prominent man in the community a criminal! Inconceivable. Who is this Pinchot anyhow? What is conservation? A fool and his dream. A dreamer and his dream. Away with them. Let us have a business administration.

This type of man has been passed in the evolution of public opinion. A few years ago he represented the normal, usual attitude toward his business. But the public conscience has developed and now he represents only an irritated and decreasing minority. He has rights that must be respected. He is not criminal in himself. He deserves and will receive a hearing and time to command the change that is coming about and to adjust it.

There is much discussion of and much interest in, the attitude of the present national administration toward the conservation movement. The ultra-conservationists profess to fear a complete reversal, while the enemies of the movement seem to be afraid that all President Taft in his quiet but effective way will prove to be a friend of the doctrine as Mr. Roosevelt himself. As far as we can judge by the public utterances of the Presi-

dent, the truth as usual lies between these extremes. It is likely that Mr. Taft believes that too much has been claimed for Conservation, and too much demanded in its name. He may think that the movement has grown somewhat too rapidly and that some pruning is necessary in order that the final growth may be well balanced, thoroughly healthy and truly vigorous. As an experienced statesman he knows that progress in any great public movement consists in a series of advances and recessions, each advance being greater than the succeeding recession, and an improvement over the preceding advance in direction and vigor. It may, I think, be accepted that he regards his function in relation to this policy like his function in relation to many other of the Roosevelt policies, namely that of placing them upon a firm legal basis. He is essentially a great lawyer and a great judge. Mr. Roosevelt is essentially a great propagandist. The two men are close friends and served together in various relations throughout the Roosevelt regime. Each is a man of vigorous militant honesty, with a high sense of justice and fair dealing, and a high ideal of citizenship and statesmanship. But in their methods of dealing with men and problems they are wide apart. No one, I believe, recognizes these facts more clearly than the men themselves. Mr. Roosevelt has stated that he believes Mr. Taft the ideal man to round out the work already begun. Mr. Taft has repeatedly reiterated his belief in the Roosevelt policies. We cannot doubt then that Mr. Taft will endeavor to right by legal methods the inequalities and the injustices to which the national attention has been called by Mr. Roosevelt in stirring messages, that were received with popular plaudits but fell on deaf legislative ears, and that he will use every endeavor to have translated into statutes the many strong constructive policies enunciated by Mr. Roosevelt and advanced through their preliminary stages by him, in some cases by the temporary device of presidential decree.

Conservation is one of these policies. We may expect to see it lopped free of such fads and impracticable doctrines as have been attached to it by false or unwise friends and thus improved we have every reason to expect that it will receive Mr. Taft's vigorous and effective support. Indeed, many practical steps are now being taken in a quiet way toward the enforcement of Conservation principles. I may mention one striking example that illustrates the tendency. Coal lands that form part of the public domain of the United States are no longer sold for \$1.25 per acre, but are now purchasable only at a price based on the quality of the coal, its relation to transportation and its estimated tonnage. Under this policy, maximum prices of \$300.00 per acre are being paid and these receipts go to swell the Reclamation fund. This is indeed practical Conservation, and conservation of this type in which you here in Hawaii are especially interested, and in the promulgation of which under the leadership of your Territorial

officials you have already taken such advanced ground, is sure to go on.

The Conservation movement although its name and its great prominence are recent, is not new. Like all great, right, movements, it has long been growing slowly and had really acquired much quiet momentum before it found a powerful advocate in Theodore Roosevelt.

Men here and there all over the Union have long realized the needless waste in our use of our natural products and have deprecat- ed it. Several scientific bureaus in Washington have been engaged for years, some of them for a quarter of a century or more in laying the foundation for the present policy. But the leaders have recognized that it is not sufficient before the bar of public opinion, to hold convictions. It is necessary to be able to prove them so that the other fellow may be convinced also.

The prophet is in effect a mere dreamer until he can prove that his prophesy is based on sufficient facts and sufficient well based theory. Ten centuries ago the man who predicted that the sun would disappear for an hour at noonday a month or a year or a century later would have been jeered at. Now we do not question the accuracy of predictions of lunar eclipses. Eighteen years ago when Major J. W. Powell, Second Director of the U. S. Geological Survey, told a great gathering of irrigators and promoters in the Southwest that when every available drop of water in the arid states and territories was fully utilized, not five per cent. of the deserts could be irrigated, he was greeted by yells of derision. He was right by a wide margin, and the 10,000 who contradicted him were wrong, but he could not prove his point, because the necessary facts had not been collected. This collection was soon begun, however, and the foundation for the Reclamation Service was thereby laid. When fifteen or twenty years ago forest conservation was first advocated in the United States, the advocate was told that he was a fool, that the timber resources of the mainland were so vast that they could not be exhausted, and though he did not believe it, he could not prove his point; but the mapping of forest areas and the estimation of standing timber and of its annual reduction began forthwith, and now with these estimates fairly complete, the Forest Service is able to tell us authoritatively that without a radical change in policy, our forests will disappear in 30 or 40 years.

From time to time voices have been heard advocating regulation of coal and iron mining, because of danger of exhaustion of the reserves of these minerals, but facts have not existed until recently to prove this anxiety to be well based. As the result, however, of more than 25 years of patient exploration and investigation and careful mapping, the U. S. Geological Survey is now able to present fairly satisfactory estimates of the reserves of these and many other natural resources, and of their rate of exhaustion, so that here also the advocate of a policy of Con-

servation has facts upon which to base his argument. As a result, the word with which in the old days he was always halted, namely "inexhaustible" has disappeared from the vocabulary of the opponents of the policy.

Thus you see that the movement for which this meeting stands and in the practical application of which the Territory of Hawaii has made great advances, is not one of sudden nor of particularly recent growth. The Federal Bureaus have been patiently preparing for that time, when evidence should exist that would enable the irresistible logic of the movement to be asserted, and when a champion should arise to whom the people should listen. The man and the hour arrived in Roosevelt's administration and the effective champion appeared in Gifford Pinchot, with his broad grasp, his earnest practical idealism and his charming personality.

With the contemporaneous appearance of all these favorable factors the movement suddenly blossomed out like the cereus, in a night as it were, and the nation woke up to a realization that a great movement was under way.

Now that realization of the wisdom of the policy and of the need of action has been forced upon the nation, the time for definite constructive policies, and for legislation is here. This does not mean that the stock taking period is past. The census of our existing resources is not by any means complete and must be continued, and it does not mean either that there has been no conservation legislation. There are initial laws among our federal statutes, and you have territorial enactments that give force to the movement. In short, the periods of the propaganda and of action, legislative and executive, overlap; nevertheless, that period upon which we have just entered is essentially one of translating into law, those conservation policies which are sufficiently fully tested to justify this action. There is danger in this movement, as in any movement that has become popular, that its unwise friends may bring about the passage of premature or of ill-considered laws that may retard instead of advancing the fundamental idea of conservation, namely, the *maximum possible beneficial use* of all resources, now and in the future, or as it has been recently well expressed, "the greatest good of the greatest number, for the longest time." It opposes undue sacrifice of the future for the present, but it does not, as some of its opponents maintain, advocate undue sacrifice of the present for the future. It always opposes needless waste.

The work Mr. Leighton and I are beginning here by invitation of your Governor and other Territorial officials, has to do with the stock-taking phase of one branch of Conservation work, namely, Conservation of the Water Resources. As all arid or semi-arid sections increase in population, there comes a time when the mounting value of agricultural land brings about a keen

demand for water, through whose use alone, dry lands can be made productive.

A short-sighted policy leads to the easiest use in the cheapest possible way of the most obvious sources, to the neglect of others of perhaps equal potential value. And the construction of canals and irrigation systems on this basis may make impossible the final utilization of all the sources, just as hurried careless lumbering may render unavailable for man's use, more timber than is harvested.

A far-sighted policy on the other hand calls first for a study of all the sources, their relations to one another, their character, the habit of flow of streams, whether regular or spasmodic, the possibilities of storage and of power development, the relations of underground supplies to surface supplies and to power, the best ways to integrate the two, and the relations of soil and forest cover to both. With data of this kind in hand, as a result of years of measurement and investigation, the irrigation engineer can so plan his construction as to make the fullest possible use of all the water. Attempts to construct without such data lead to failures of a type with which the arid lands of the west are dotted. Expensive systems have been built in many areas and it has been discovered later that not sufficient water is available to operate them, or that an important source has been overlooked and could not then be utilized.

It is to avoid errors of this kind that a systematic survey of the waters of the Territory is now being undertaken, and as it progresses, you will find yourselves laying a broader and broader foundation for that true development that knows no retrogression because it is founded on precise knowledge of those factors upon which it depends.

MR. PINCHOT'S ADDRESS AT SPOKANE.

The following address of Mr. Gifford Pinchot, United States Forester, and Chairman of the National Conservation Commission, was delivered at the National Irrigation Congress at Spokane, Washington, August 10th, 1909:

The most valuable citizen of this or any other country is the man who owns the land from which he makes his living. No other man has such a stake in the country. No other man lends such steadiness and stability to our national life. Therefore, no other question concerns us more intimately than the question of homes. Permanent homes for ourselves, our children, and our Nation—this is the central problem. The policy of national irrigation is of value to the United States in very many ways, but the greatest of all is this, that national irrigation multiplies the men who own the land from which they make their living. The old saying, "Who ever heard of a man shouldering his gun to

fight for his boarding house," reflects this great truth, that no man is so ready to defend his country, not only with arms, but with his vote, and his contribution to public opinion as the man with a permanent stake in it, as the man who owns the land from which he makes his living.

Our country began as a nation of farmers. During the periods that gave it its character, when our independence was won and when our Union was preserved, we were preëminently a nation of farmers. We can not, and we ought not, to continue exclusively, or even chiefly, an agricultural country, because one man can raise food enough for many. But the farmer who owns his land is still the backbone of this nation; and one of the things we want most is more of him.

The man on the farm is valuable to the nation, like any other citizen, just in proportion to his intelligence, character, ability, and patriotism, but unlike the other citizens also in proportion to his attachment to the soil. That is the principal spring of his steadiness, his sanity, his simplicity and directness, and many of his other desirable qualities. He is the first of home-makers.

The nation that will lead the world will be a nation of homes. The object of the great conservation movement is just this, to make our country a permanent and prosperous home for ourselves and for our children, and for our children's children, and it is a task that is worth the best thought and effort of any and all of us.

To achieve this or any other great result, straight thinking and strong action are necessary, and the straight thinking comes first. To make this country what we need to have it, we must think clearly and directly about our problems, and above all we must understand what the real problems are. The great things are few and simple, but they are too often hidden by false issues, and conventional, unreal thinking. The easiest way to hide a real issue always has been, and always will be, to replace it with a false one.

The first thing we need in this country, as President Roosevelt so well set forth in that great message which told what he had been trying to do for the American people, is equality of opportunity for every citizen. No man should have less, and no man ought to ask for any more. Equality of opportunity is the real object of our laws and institutions. Our institutions and our laws are not valuable in themselves. They are valuable only because they secure equality of opportunity for happiness and welfare for our citizens. An institution or a law is a means, not an end, a means to be used for the public good, to be modified for the public good, and to be interpreted for the public good. One of the great reasons why President Roosevelt's administration was of such enormous value to the plain American was that he understood what St. Paul meant when he said: "The letter killeth, but the spirit giveth life." To follow blindly the letter of the law, or the form of an institution, without intelligent re-

gard both for its spirit and for the public welfare, is very nearly as dangerous as to disregard the law altogether. What we need is the use of the law for the public good, and the construction of it for the public welfare.

It goes without saying that the law is supreme and must be obeyed. Our civilization rests on obedience to law. But the law is not absolute. It requires to be construed. Rigid construction of the law works, and must work, in the vast majority of cases, for the benefit of the man who can hire the best lawyers and who have the sources of influence in law-making at their command. Strict construction necessarily favors the great interests as against the people, and in the long run can not do otherwise. Wise execution of the law must consider what the law ought to accomplish for the general good. The great oppressive trusts exist because of subservient law makers and adroit legal constructions. Here is the central stronghold of the money power in the everlasting conflict of the few to grab, and the many to keep or win the rights they were born with. Legal technicalities seldom help the people. The people, not the law, should have the benefit of every doubt.

Equality of opportunity, a square deal for every man, the protection of the citizen against the great concentrations of capital, the intelligent use of laws and institutions for the public good, and the conservation of our natural resources, not for the trusts, but for the people; these are real issues and real problems. Upon such things as these the perpetuity of this country as a nation of homes really depends. We are coming to see that the simple things are the things to work for. More than that, we are coming to see that the plain American citizen is the man to work for. The imagination is staggered by the magnitude of the prize for which we work. If we succeed, there will exist upon this continent a sane, strong people, living through the centuries in a land subdued and controlled for the service of the people, its rightful masters, owned by the many and not by the few. If we fail, the great interests, increasing their control of our natural resources, will thereby control the country more and more, and the rights of the people will fade into the privileges of concentrated wealth.

There could be no better illustration of the eager, rapid, unwearied absorption by capital of the rights which belong to all the people than the water power trust, not yet formed, but in rapid process of formation. This statement is true, but not unchallenged. We are met at every turn by the indignant denial of the water power interests. They tell us that there is no community of interest among them, and yet they appear year after year at these Congresses by their paid attorneys, asking for your influence to help them remove the few remaining obstacles to their perpetual and complete absorption of the remaining water powers. They tell us it has no significance that the General Electric interests are acquiring great groups of water powers in vari-

ous parts of the United States, and dominating the power market in the region of each group. And whoever dominates power, dominates all industry. Have you ever seen a few drops of oil scattered on the water spreading until they formed a continuous film, which put an end at once to all agitation of the surface? The time for us to agitate this question is now, before the separate circles of centralized control spread into the uniform, unbroken, nation-wide covering of a single gigantic trust. There will be little chance for mere agitation after that. No man at all familiar with the situation can doubt that the time for effective protest is very short. If we do not use it to protect ourselves now, we may be very sure that the trust will give hereafter small consideration to the welfare of the average citizen when in conflict with its own.

The man who really counts is the plain American citizen. This is the man for whom the Roosevelt policies were created, and his welfare is the end to which the Roosevelt policies lead. As a nation we are fortunate at this time in this fact above all others, that the great man who gave his name to these policies has for his successor another great President whose administration is most solemnly pledged to the support of them.

I stand for the Roosevelt policies because they set the common good of all of us above the private gain of some of us; because they recognize the livelihood of the small man as more important to the nation than the profit of the big man; because they oppose all useless waste at present at the cost of robbing the future; because they demand the complete, sane, and orderly development of all our natural resources, not forgetting our rivers; because they insist upon equality of opportunity and denounce monopoly and special privilege; because discarding false issues, they deal directly with the vital questions that really make a difference with the welfare of us all—and most of all, because in them the plain American always and everywhere holds the first place. And I propose to stand for them while I have the strength to stand for anything.

PRESIDENT TAFT AND CONSERVATION.

Telegram to the First National Conservation Congress.

Executive Office,

Beverly, Mass., Aug. 26, 1909 —

"To the First National Conservation Congress,

Seattle, Washington.

I congratulate you on the objects of your meeting and sincerely hope that your deliberations will result in useful conclusions. You can count upon the earnest support of this administration of the policy of conservation of natural resources every reasonable means properly within the federal executive jurisdiction and such recommendations to Congress as may best adapted to obtain useful legislation towards the same end.

WILLIAM H. TAFT.

THE HAWAIIAN FORESTER AGRICULTURIST

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This paper is fortunate in being able to present to its readers an address by Mr. W. C. Mendenhall, of the Bureau of Conservation, upon the application of the Federal Reclamation laws to Hawaii, delivered before the Social Science Club at the residence of Governor Frear during the current month. So great benefits have accrued on the mainland from the undertaking of the government of large irrigation projects, that the suggestion of the extension of the system to this Territory at once met with general approval, and an effort was set on foot to endeavor to secure the end desired. The promoters of this plan were encouraged by the fact that since the passage of the reclamation act restricting its application to certain states, Texas has been included within its operation. In order to bring about the desired change the Hawaiian Delegate introduced a bill in Congress last January, which was referred to the Committee on Irrigation of Arid Lands, and ordered printed. The Territory was also represented by a delegation of six members at the National Irrigation Congress recently held at Spokane, and was successful in obtaining the passage of a resolution recommending to Congress the extension of the Federal reclamation system to Hawaii. In spite of these encouragements, there is no doubt that much time must elapse before the desired legislation is obtained. This is now being profitably employed in the taking of an inventory of the water resources of the Territory—an operation which to be effectual will take some three or four years, and necessarily must precede the inception of any irrigation project. In the meantime, it seems well to pause to consider in its full, the effect the extension of the Federal reclamation act would have upon our local conditions, and whether its operation in Hawaii would be calculated to produce the desirable result which was at first believed. A careful perusal of Mr. Mendenhall's address will go far to a clearer understanding of this subject and will appreciably help in bringing about that general discussion which such an important question merits.

That certain difficulties lie in the way of securing a favorable hearing before Congress goes without saying, but these difficulties will be greatly magnified if an effort is made to obtain a modification of the Federal laws to suit our local conditions. Before un-

dertaking a campaign, of which there would be little prospect of success, it is well to consider how the law, as it now stands, would apply in Hawaii. An analysis of this is entered into in Mr. Mendenhall's paper. It seems, however, that the clause against Mongolian labor would not present an insuperable difficulty as a large demand for citizen labor for Federal irrigation construction would no doubt meet with sufficient response. Incidentally it would be interesting to know whether the term "Mongolian" has the same legal meaning as it has as an ethnological term.

As an alternative to Federal assistance in this matter, the writer of the address alluded to, suggests the establishment of a Territorial Reclamation Bureau, supported by a revolving fund created by an issue of bonds chargeable against the lands to be benefitted. Such a project is in operation in Porto Rico with considerable success, although the conditions there are dissimilar to our own. The creation of a local system of reclaiming arid lands has the distinct merit of allowing its organization on lines to harmonize with the eccentricities of our local land laws.

Foremost among the enemies of the human race may be enumerated rats, flies and mosquitoes. Although many inimical influences are continually at work against mankind, it is questionable whether the accumulated devastation of famines, of wars, or of convulsion of nature is to be compared with the detrimental effects, both direct and indirect, of the three baneful pests to which we have alluded. By their combined agencies, apart from the destruction to food and other stuffs on the part of rats, the bacilli of bubonic plague, yellow fever, typhoid, consumption, cholera, malaria, anthrax, trachoma and other dangerous diseases are propagated and disseminated. The Hawaiian Islands are, by their isolation, very favorably situated to be able to put into force measures to check and destroy these pests, for by the exercise of an efficient quarantine they should be practically unable to recruit their ranks from without. With regard to the mosquito, excellent work has, from time to time, been done locally for its suppression, although a tendency has been too often evidenced to rest content upon the result of past success. At present this pest is again in evidence thanks to a temporary suspension of the active campaign against it. With regard to the mosquito, as with all such pests, immunity can only be purchased at the price of incessant effort. There is never a time when it is possible to count the victory permanently won, or when vigilance can be with safety relaxed.

Honolulu has in the past organized attacks also upon the rat, especially when public action has been aroused by a sense of the dangerous part this animal has played in the spread of bubonic plague. Although the rat is ever with us, it is not here the intention to call especial attention to it, but to that other household nuisance, the fly, which has been too long accepted passively as a necessary evil. Although we have grown so accustomed to its

amiliar presence as to tolerate it and merely to regard it as a harmless nuisance, it is now known to be not only a loathsome and filthy creature, but a spreader of many of the most terrible diseases of mankind. When it is appreciated that the fly has a radius of not much more than five hundred feet from its place of origin, and that its breeding places are as easily sought out and controlled as those of the mosquito, there is little excuse for an enlightened community to be at the mercy of this filthy disseminator of disease.

The natural breeding places of the common fly are to be found in stable refuse, in the excrement of animals, in decaying vegetable matter and in all such places as the application of proper sanitary precaution would control. Engendered in filth, the padded feet of this creature are so constructed that they readily become the vehicle of whatever disease germs they come in contact with and thus befoul everything upon which they alight. In its restless career it wanders among the foulest places and leaves a trail of potential disease wherever its persistent activities lead it. No place is immune from its abominable presence, the infant's, the invalid's and the household food supply are alike impartially visited and contaminated.

The period when the fly is most in evidence corresponds very closely with that of the greatest prevalence of typhoid and dysentery and there is no longer any doubt that the cause of many outbreaks of these disorders is immediately traceable to this insect.

In view of the danger from the fly, this insect should be vigorously excluded from the sick room, especially in the case of contagious disease. It should also be kept from the kitchen and from all household food. An effective and simple remedy is said to be a weak aqueous solution of formaldehyde exposed in saucers wherever flies are noticeable. In addition to these measures an active campaign should be instituted to remove all refuse which could be used as breeding places and to prevent the fly's access to such places as suggest themselves as favorable for this purpose. All decaying vegetable matter and all waste should be burned, treated with kerosene oil or removed. Manure from stables should be kept in covered receptacles, and no open drains should be permitted. Above all, a supply of some cheap disinfectant, such as chloride of lime, should be readily available with which to sprinkle all questionable refuse.

When the public conscience has been awakened to the extreme danger to be feared from the domestic fly, and to the possibility of the control of this noisome pest, outbreaks of many grave diseases will be fewer and will be confined to a smaller number of individual cases. A joint crusade against both the fly and the mosquito could be more profitably waged than against either separately, as the methods of attack are in many instances identical. The presence in considerable numbers of any of the three pests alluded to at the commencement of this article is a severe criticism

of the sanitary condition of a community as they are all essentially products of filth. In these islands, protected by their isolation, there is little or no excuse for sitting supinely with folded hands under the discomfort and danger of these pests and it is to be hoped that before long concerted action will be taken to keep them all permanently within control.

FARMERS' BULLETINS.

From time to time notice is published in this paper of new Farmers' Bulletins of interest or importance to those interested in agriculture in this Territory. This month particulars are given of three new bulletins, two of which should be of great use to local readers. That by C. L. Goodrich, entitled "A Profitable Cotton Farm," is particularly timely in view of the great attention being given to the subject of cotton throughout the islands. Another, "How to Destroy Rats," is of more general interest, but it no less applies to a matter which affects the well being of every community. For those who may desire the information it may be added that Farmers' Bulletin may be obtained free by mailing application for the particular ones desired to the Secretary of Agriculture, Washington, D. C.

How to Destroy Rats. By David E. Lantz, Assistant, Bureau of Biological Survey. Pp. 20, figs. 5. (Farmers' Bulletin 369.)

This Bulletin contains suggestions for rat-proof buildings and destruction of rats by traps, poisons, and by organized efforts.

Replanting a Farm for Profit. By C. Beaman Smith, Agriculturalist, and J. W. Froley, Assistant Agriculturalist, Bureau of Plant Industry. Pp. 36. (Farmers' Bulletin 370.)

This bulletin presents six different farming systems for a run-down 80-acre farm with estimated cost and returns of each type. It also indicates some of the problems and difficulties attending radical changes in a long-established farming system.

A Profitable Cotton Farm. B. C. L. Goodrich, Expert, Office of Farm Management, Bureau of Plant Industry. Pp. 23, figs. 12. (Farmers' Bulletin 364.)

An account of the successful management of a run-down cotton farm of 132 acres in South Carolina, with methods of plowing, drainage, cultivation and rotation of crops, the use of fertilizers and a statement of the cost and value of the crops produced 1908.

RECLAMATION AND HAWAII.

BY W. C. MENDENHALL, *U. S. Geological Survey.*

A paper read before the Social Science Association, Honolulu, Oct. 4, 1909.

Extensive reclamation has already been accomplished in Hawaii through the enterprise of private capitalists. Important work of this type was begun and some of it carried to completion in the days of the Kingdom, while other valuable projects, that add much to the productiveness of the Territory, have but lately been completed, and still others are in course of construction now. In general, so far as I have had opportunity to see it and to judge it, the work done, whether in the development of surface or of underground waters is of a high order, and reflects great credit upon the engineers who are responsible for its character, and upon the capitalists who have financed the work generously and have made it possible to carry the engineers' plans to completion. It seems also to be true, generally speaking, that the later work is an improvement upon the earlier, that in short, there has been a progressive advance in quality as time has passed.

But now, public opinion, encouraged and guided by the foresight of your leading citizens and your broad-minded officials and stimulated by the examples set in this Territory by private enterprise and by the greater example of Federal reclamation on the mainland seems to demand that at least that part of future work of this type that involves large areas of public land be undertaken here as a public enterprise. Demands for State or National irrigation, I believe, usually originate in this way. Private capital takes the lead. It develops projects; it proves the practicability and the value of the work and the profit to be derived from it, and at the same time, indicates the limitations under which private capitalist labors in this respect; then, there arises a demand that the State enter the field. This demand is based in part upon a recognition of the fact that the poor man cannot carry large projects to completion, and that it does not make for the best interests of the people as a whole to concentrate into the hands of a relatively small number of citizens the extended control over primary resources like land and water, nor the large profits to be won by the exploitation of these resources that usually result from the successful completion of large projects by private enterprise. There are, of course, other reasons for the growth of the feeling that work of this kind is a legitimate public function. Among them is the knowledge that the necessity under which the private capitalist labors of making interest upon his investment, will limit him to developments of the type that will yield the largest returns with the least outlay. This will result in many cases, in making available for cultivation, a much smaller acreage than the max-

imum that might be developed were the profit feature eliminated. Furthermore, this development along the lines of least resistance may make unavailable for an indefinite period the lands excluded from the private enterprise; whereas, they might well have been included in the original construction plans had not the argument of greatest possible profit on investment controlled the construction. There are other elements too that enter into the argument in favor of making irrigation and conservation enterprises public functions. Among them being the greater permanency of construction and the better type of building, which are believed generally to be features of well-managed Government construction. At any rate, the point seems to have been reached in this Territory where it is believed that Reclamation should be undertaken by the representatives of the public. It was long before this stage in irrigation development was reached on the mainland but it came at last in 1902, when the Federal Government, by the passage of the Reclamation Act, entered the field as a builder of irrigation projects. Other governments had long ago undertaken public work of this character. For instance, the British Government, in its monumental irrigation work in the Nile Valley and in India, so that the principle was not new.

On the mainland of the United States, where the passage of the Reclamation Act represents the culmination of a battle of twenty-five years between the *pro* and the *anti* Federal irrigationists, those entrusted with the administration of the law do not consider that its operation will put an end to private construction or indeed, seriously interfere with it, but rather that it will stimulate private enterprise by erecting in many parts of the west, monuments to the value of irrigation, and by the solution through the coöperation of its large and efficient corps of engineers, of many of the heretofore unsolved problems of irrigation engineering and irrigation administration. Furthermore, by the examples it sets of well planned, high grade work, it will make more difficult the attempts of the ill-financed promoter to dispose of poorly planned, short-lived, and inferior systems. Thus the operation of the Reclamation Act is not only opening directly to settlement millions of acres of the arid and semi arid portions of the West, but is indirectly stimulating private enterprise to develop other smaller projects in better fashion than before the law was enacted.

As I have said, the passage of the Reclamation Act was the fruition of a movement that had been underway for many years. The desert land law, approved March 3, 1877, encouraged reclamation by individual effort by conferring title to 320 acres of arid lands instead of 160, as under the Homestead Law, providing certain conditions as to irrigation were complied with. In 1879, Major Powell issued his famous report, in which he insisted that the irrigation problems of the West were of such a nature as to require government action. This report caused much discussion and was the source of a growing interest in the problem, that pro-

luced the Joint Resolution of March 20, 1888, and the Act of October 2 of that year, providing for an Irrigation Survey to determine to what extent the arid lands could be reclaimed by irrigation, and appropriating \$100,000.00 for this inquiry. These laws provided, further, that all public lands that might be susceptible to irrigation be reserved from sale. In the administration of this clause of the law, there was a general withdrawal of all the arid lands from entry. This action caused much dissatisfaction and resulted in the rescinding of the law and the omission of the appropriation which, meanwhile, had been increased to \$250,000.00. But while the special irrigation surveys were thus halted, general surveys, that later proved invaluable in irrigation work were continued, and in addition, it was provided that all public lands sold West of the 100th Meridian, were sold subject to rights of way for ditches and canals, constructed by authority of the United States. This provision also proved of great value later.

The Carey Act passed in 1894 and amended in 1896 provided not for the construction of irrigation works by the Federal authorities but for the encouragement of irrigation by the cession to certain States of not more than one million acres each, of public lands, provided the State should cause them to be "irrigated, reclaimed and occupied," and not less than 20 acres in each 160 cultivated, etc. Up to the present time, however, but little reclamation work has been effected under this law.

Finally there came in 1902 the passage of the Reclamation Law, creating a fund derived from the sale of public lands. This fund was to be used "in the examination and survey for and the construction and maintenance of irrigation works, for the storage, diversion and development of waters for the reclamation of arid and semiarid lands," in sixteen of the Western States and Territories. In 1906, it was extended to include a seventeenth State, Texas.

Meanwhile, under the Organic Law of the United States Geological Survey, passed in 1879, such general investigations of the Water Resources of the United States were carried out as were possible under its terms. In 1894, Congress made a specific appropriation of \$12,500.00 for this work, gradually increasing the amount until in 1903, it had reached \$200,000.00 annually. Since then, however, it has been reduced, and for three years past, only \$100,000.00 has been appropriated each year. These funds have been used, in the language of the statute, "for gaging the streams and determining the water supply of the United States and for the investigation of underground currents and artesian wells, and the preparation of reports upon the best methods of utilizing water resources."

By means of these direct appropriations, and other appropriations for topographic mapping, which bore less directly upon the problem, fundamental data had been secured, and a force of engineers trained that enable the Geological Survey, which at first

was given the disbursement of the Reclamation Fund, to undertake the construction of irrigation works in the arid states as fast as the growth of the fund permitted. The total amount paid into the Treasury for this purpose up to the present is about \$50,000,000.00. That expenditures in construction keep close pace with the growth of the fund is illustrated by the fact that the expenditures at the end of the fiscal year 1907 were about \$33,000,000.00 while the fund at that time amounted to about \$35,000,000.00. Later figures as to these relations are not available. The allotments thus far made have been distributed among 36 projects, the cumulative amounts varying from \$10,000.00 to \$7,000,000.00 for each project.

This summarizes in the very briefest fashion the movement to date for national irrigation on the mainland.

Hawaii desires to share in some form of governmental reclamation because she believes that for reasons already given, government control of the fundamental elements of production, namely, soil and water, is better than private control of these elements, and because she holds large bodies of public lands that will be affected in the coming movement, either as sources of water supply, or as lands that will be irrigated.

How then can this work be most effectively accomplished? Is it possible to secure the extension of the Reclamation Act to the Territory? What will be the effect of that extension if it is secured, and what are the alternatives if it cannot be? These are live questions, much in the minds of your territorial officials because they realize that the entire territory is deeply concerned in seeing that they are properly answered. The final answer need not be given for a few years, because the preliminary steps that have been taken are essential, whatever solution is eventually adopted, but it is none-the-less appropriate to consider the entire question and so to decide as to the wisest general policy to adopt.

The field of the Federal service is at present restricted by law to seventeen States and Territories on the mainland, one of which, Texas, has been added to the original group since the passage of the Act in 1902. This State is like the Territory of Hawaii in one respect, namely, that it can make no contribution to the Reclamation Fund in advance of construction. The lands in Texas that are being reclaimed by the Federal Engineers will repay to the Government, dollar for dollar, the amount expended upon them, so that the admission of Texas to share in the benefits amounts to a loan without interest from the Reclamation Fund to the lands in question. In addition to this loan of funds, the State secures the benefit of the engineering organization of the Service, this benefit taking the form presumably of a decreased cost to the land owner through the efficiency of the trained engineers. Some such form of sharing in the benefits of the Reclamation Service, I presume, is in the minds of those who desire to see the functions of the Service extended to this Territory. In considering the wisdom of

his extension, or of any alternative action, it may perhaps be well to consider first, how the Act would apply here.

To discuss accurately its applicability requires a legal analysis of the Reclamation Act, and an understanding of your local statutes. I have not the equipment for such an analysis, nor am I acquainted with your local laws, therefore, all I can hope to do is to open the subject, and to call your attention to certain matters that appeal to a layman, who is more or less familiar with the operation of the Reclamation Act.

Section 1 of the Reclamation Act provides for the creation of the fund from the proceeds of the sales of public lands in certain States and Territories;

Section 2 authorizes the Secretary of the Interior to make the necessary examination and surveys, and to construct irrigation works, and directs him to report to Congress the results of these examinations, etc.

Section 3 directs the Secretary of the Interior to withdraw from public entry "the lands required for irrigation works," contemplated under the provisions of the Act, and directs him to restore these lands to entry when in his judgment they are not required for the purposes of the Act; and he is "authorized" but not "directed" to withdraw from entry, except under the Homestead laws, all lands believed to be susceptible of irrigation from the works to be constructed. This section provides further "that all public lands which it is proposed to irrigate by means of any contemplated works shall be subject to entry only under the provisions of the Homestead laws in tracts of not less than 10 nor more than 160 acres.

In this section, difficulties begin to appear, due to the fact that the Reclamation Law was written for the mainland, and the land laws that obtain there.

Section 4 provides that the Secretary shall let contracts for construction, etc., shall give due notice of the lands to be irrigated, the limit of area per entry, etc. Here, too, the Homestead laws are in contemplation as is evident by the general terms of this section. The last paragraph of the section provides that 8 hours shall constitute a day's labor in all construction work, and that no Mongolian labor shall be employed. This last provision would seriously hamper all building in this Territory, and greatly increase all costs, if it were to be applied here.

Section 5 provides for compliance on the part of the entryman with the homestead laws, and especially states that no water rights shall be sold to lands in private ownership, under the project, in tracts of more than 160 acres, and no such sale shall be made to any land-owner unless he be a bona fide resident on such land or occupant thereof residing in the neighborhood of said land. It further provides for the manner of making payments for the reclamation work, etc. This section again does not well apply here. Should a project be planned to benefit the large plantations that

include bodies of land of greater area than 160 acres not in Government ownership, the owners would be forced to sell out in smaller tracts or the Reclamation Law would have to be changed. In other words, there would be difficulty in applying this type of reclamation to cane lands which to be managed to advantage, apparently must be held in large bodies. In the matter of payments for reclamation, the section provides that they shall be made "to the local land office of the district in which the land is situated." There are no local Federal Land Offices nor officers here so that adjustment as to this phase of the law would be necessary.

Section 6 provides for the payments of the cost of operation and maintenance of all reservoirs, etc., from the Reclamation Fund, declares that when payments have been made for the major portion of the lands irrigated, the management shall pass to the owners of the land, etc. This section appears to offer no difficulty.

Section 7 provides for the acquisition of property necessary to the operation of the law by judicial process.

Section 8 provides that the law shall not affect State or Territorial water laws or rights acquired thereunder.

Section 9 provides for the expenditure of the major portion of the funds contributed by each State or Territory within that State or Territory.

Section 10 is a general enabling clause which gives the Secretary authority to make the necessary rules and regulations, etc. to carry out the law.

In this hasty inspection of the Act, it is obvious that it will not apply to your own land laws, which have been carefully developed to suit your local conditions, because everywhere it is adjusted to the homestead law of the mainland. There is no provision in it for the acquisition of title in any other way than under the terms of the homestead act, modified only as to size of the tract entered. There is no provision for your various types of purchase and none at all for your leaseholds. Furthermore, its provision as to Mongolian labor, considered in connection with the Federal contract labor law, is alone almost fatal to its application here.

It is obvious then that if the Territory is to secure the benefit of the Act, either the Act itself must be extensively modified to suit territorial conditions or you must be prepared to suspend your own carefully enacted land laws in the districts to be reclaimed, and to build, as you have never done before, with high-priced and scarce Caucasian labor, thereby greatly increasing the cost of each project.

Congress guards the Reclamation Act with great jealousy. To secure its extension to Texas no changes at all were required; the final law approved June 12, 1906, providing simply that "the provisions of the Act be and the same are hereby extended so as to include and apply to, the State of Texas." Yet this extension was not secured without difficulty, and Texas has a large voting delegation in Congress. He is indeed sanguine who believes that

an Act, without the Mongolian labor clause, and so modified as to fit your local land laws, can be passed.

The other alternative, in the extension of the provisions of the Reclamation Act to this Territory, is that adopted in the Bill introduced in the 60th Congress and reintroduced in the extra session of the 61st. This Bill is similar to the Texas Extension Act and provides simply for the extension of the Reclamation law, without modification to the Territory. Should it pass, it will require the suspension of your own land laws in the areas of the projects to be developed.

With the law thus extended, you would have in operation in this Territory, two sets of land laws, the homestead act within the areas of the projects and your local laws elsewhere. Furthermore, provision could not be made, under projects that might include low warm lands, much more valuable for cane than for other crops, to retain these lands in large bodies, either in fee or in leaseholds; they would have to be sub-divided into tracts of not more than 160 acres each. Doubtless these tracts with the appurtenant water rights would be combined into large plantations as soon as the homesteaders could secure title. But thus assembled, the plantations would become owners in fee and would pass beyond the possibility of government regulation such as you are trying to secure elsewhere, by your system of leaseholds. In addition to this, any large plantations to which it would be feasible and advisable from the engineering point of view, to extend the benefits of the project would be compelled to subdivide and to sell. And finally, this general extension Act carries with it the 8-hour clause and the Mongolian labor clause, which surely must be modified by subsequent legislation to make construction feasible here.

These difficulties seem real enough to make it worth while to consider any other alternative that may exist, in case it proves impossible or you should decide that it is impracticable to secure the extension of the Federal law to the Territory.

It has been suggested that Hawaii might create its own Reclamation Service. Similar steps have been taken elsewhere. Porto Rico, for instance, after finding that there was no probability that Federal Reclamation would be extended to that island, eventually adopted the alternative of creating a reclamation fund of its own, issuing bonds against the lands to be benefitted, and organizing by means of the funds thus raised, a local Reclamation Bureau. This bureau has been placed in charge of one of the trained engineers of the Federal Service, Mr. B. M. Hall, who was transferred to that island for the purpose. The project thus inaugurated is of some magnitude since it involves an expenditure of \$3,000,000.00.

One of the principal difficulties that occurs to you at once, of course, when the question of organizing your own service is broached is the matter of funds. But it seems to me that this difficulty is not insuperable nor even very serious. The central idea of the Federal Reclamation service is a non-disappearing

fund. Using this idea as a basis, why will it not be possible, when your preliminary work is done, to create a Territorial Fund by the issue of bonds, to be repaid, principal and interest, by the lands that receive the benefit of the reclamation, just as the Federal Reclamation Fund is restored by collecting from each acre irrigated its proportion of the total cost of the project? Such an issue would not increase your tax rate and would not increase your general indebtedness, because it would be a special issue, providing for its own cancellation. It would be inferior to the Federal Fund, in that there would be an interest charge against it, but probably this would be much more than compensated in all cases by the greater value of the lands reclaimed.

If such a bond issue is authorized, the authorization should give to the proper officer, discretion as to the time of sale. Bonds would then be sold only as the money was needed in construction, and the interest charges would thereby be reduced to a minimum. This plan has been adopted in the authorization of the \$23,000,000 bond issue by which Los Angeles is constructing the Aqueduct for her new water supply.

With the funds thus provided, the Territory would be able so to plan its reclamation as to harmonize thoroughly with local conditions, legal and agricultural. It could, further, take advantage of many lessons that have been learned on the mainland, and could combine in its service, functions that are now scattered there among many bureaus. For example, the Geological Survey makes stream gauging for the Reclamation Service, and the Agricultural Department makes soil surveys, and gives advice as to crops. Furthermore, the Reclamation Service has no expendable fund. All the money that it uses must go back to the treasury. It is therefore embarrassed in the investigation of possible new projects, for often, of course, that investigation will itself prove that the project is not feasible, hence there is nothing against which to charge the investigation. You could correct this condition by placing under your Reclamation engineer, the expenditure of a part of your Conservation Fund, which could be used for those preliminary surveys that did not lead to the building of a project. In short, with a clear field before you, you would have an opportunity to enact an ideal piece of Reclamation Legislation and to conduct a model service.

I see no reason either why you should lose the valuable advice of the Federal Service, by organizing your own. Doubtless, if you desired, an engineer would be detailed to you as one has been detailed to Porto Rico. Personally, I do not believe this would be necessary, because you now have in this Territory irrigation engineers, who have proved their capacity under local conditions by admirable construction, and who because of their thorough acquaintance with the local problems, are probably quite as well equipped for your work as an engineer of broader experience but less local knowledge. It is probably true also that with a local

service you could secure a review of plans by the Consulting Boards of the Federal Service, just as Porto Rico and each project on the mainland now secure such reviews, namely, by paying the cost.

In any event, whether your Reclamation be Territorial or National, you will not be ready to commence construction for four or five years at least. Water supplies must be thoroughly studied, storage possibilities investigated, and the general topographic surveys, that should precede detailed Reclamation surveys, must be made. This work you are now beginning as a result of the foresight of your territorial officers, but it will take time to secure results. These results, however, must be secured no matter what plan of Reclamation is finally adopted. No time therefore is being lost.

Meanwhile there is time in which to formulate a policy for the future. The possibility and the desirability of securing necessary Congressional action can probably be pretty well determined in four or five years, and if it should prove impracticable, or if you should decide that it will prove unwise, a carefully drawn Territorial Reclamation Act can be recommended to your own Legislature, and if one may judge by your success in securing wise legislation in the past, there should be little doubt about its enactment into law.

BY AUTHORITY.

PROCLAMATION.

ARBOR AND CONSERVATION DAY.

The practice of setting aside one day each year as Arbor Day began in Hawaii in 1905. Since then, on the mainland, and especially during the last year in Hawaii, the larger movement for the conservation and development of all natural resources, of which Arbor Day represents only one phase, has received tremendous impetus. Not only has the public conscience and interest been quickened on this subject, but it has taken practical form in the inauguration and extension of actual work in many directions in this Territory, rendered possible by the broad and far-sighted action of the last Legislature.

It is, therefore, fitting that this year the scope of the day be enlarged, and, accordingly, I hereby designate Friday, the 12th day of November, 1909, as ARBOR AND CONSERVATION DAY for the Territory of Hawaii, and recommend that on that day appropriate exercises be held in all the schools of the Territory and that a part of the day be devoted to the planting of trees and shrubs.

Given under my hand and the Great Seal of the Territory
 SEAL] of Hawaii at the Capitol in Honolulu this 14th day of October,
 A. D. 1909.

W. F. FREAR,
 Governor of Hawaii.

COTTON PROSPECTS IN HAWAII.

A large and representative gathering assembled at the invitation of the Honolulu Chamber of Commerce in the Stangenwald building on Wednesday, October 20th, to hear an address by Director Wilcox of the Hawaii Experiment Station on the present status of the cotton industry as regard its future in this Territory, and the market value of local grown cotton.

Mr. Wilcox recently returned from a visit to the cotton belt of the Southern States, during which he visited the principal growing areas. As is well known to Hawaiian readers the last year has witnessed the development of a very general interest in the possibilities of cotton as an island crop and many agriculturists have already begun to experiment in its cultivation. From the first the Hawaii Experiment Station has taken an active part in this promising movement and has not only made series of test plantings, but has distributed much seed among those who have cared to avail themselves of the Station's offer to supply samples. The recent visit of Mr. Wilcox to investigate the industry on the mainland has been in line with the efforts of the Station to bring before intending local planters all information possible upon the subject at the present time.

After introduction by Mr. J. P. Cooke, Director Wilcox prefaced his address by giving a brief outline of his recent itinerary and then alluded to the outlook for cotton in general. Never before have the prospects of the industry been so encouraging as at present and countries which have not to face too unfavorable labor conditions and are not greatly affected by harmful pests have every reason to be optimistic of the future. Although the United States supplied thirteen of the seventeen million bales grown last year, the home production has for some time been decreasing at the rate of about half a million bales yearly and there seems little prospect of this falling off being stopped. The yield of other cotton producing countries, such as Cuba and South Africa, is also not increasing as was anticipated.

The decrease of supply in the United States is chiefly due to the attacks of the boll weevil, which are now making larger and larger inroads upon the production. Fortunately the high temperatures which have prevailed during the past year have acted as a very appreciable temporary check upon the devastation of the weevil, and in large parts of Texas it has practically disappeared. Such high temperature is, however, unusual and there is great fear that in a few years the boll weevil will be found in the heart of the sea island cotton district of the Carolinas and Georgia and will thus reduce the supply of that section. Another pernicious pest which is causing great destruction is the "cotton wilt," which has killed out large areas—one which the speaker had seen on his late visit covering four thousand acres.

Mr. Wilcox drew attention to the quality of **sea-island cotton**,

which, by careful selection, has been brought to a condition of great excellence. In some instances, for special grades, as much as seventy cents per pound has been obtained. Much of this high class product is used for the manufacture of the best quality of mercerized cotton and also to mix with silk for various kinds of artificial silk goods and for the strengthening of automobile tires. For this latter use there is a large demand at fancy prices for all the highest quality that can be produced. From samples exhibited by Mr. Wilcox, the best Hawaiian cotton, if properly prepared, is equal to the finest of the mainland product, and this fact is borne out by the opinion of experts to whom samples of our local fiber have been submitted.

One remarkable thing about the mainland planters is their conservatism. Although a small body of growers have, through the adoption of seed selection and other methods of improvement, evolved a cotton of superior merit which commands prices of from thirty-five cents per pound, the general planter is content to grow an inferior article for which he only receives about nineteen cents. This is the more remarkable when it is known that the plantations which thus cling to old methods are practically contiguous to the more enterprising ones, thus showing that the spread of good ideas is a very slow process even among apparently enlightened people.

The cultural operations of cotton are well known so that it is inexpedient and unnecessary for the Hawaiian planters to experiment in this direction. A thorough shallow cultivation is imperative and no one should contemplate the production of this crop unless he can give it the requisite attention. The main difficulties are to be found in the method of picking and curing the fiber. So far as the handling is concerned, the local pickers have much to learn from the Southern negroes, who are able to gather from seventy to one hundred pounds a day. The Japanese are at present not nearly so efficient, but they should, when they have attained the necessary dexterity, do much better.

The curing process must also be studied and understood in order to bring out the best qualities of our own cotton. By this method the individual filaments become straighter and a staple of apparently better length is obtained. In order that each Hawaiian grower may experiment in producing a cotton of higher merit, Mr. Wilcox advised the possession of at least a hand gin, by means of which seed selection may be practiced.

So far as the yield per acre is concerned, Hawaii has a tremendous advantage over the mainland, and a production of at least double should be obtained. The cotton plant here becomes perennial and although renewed plantings would be required at stated intervals, by systematic irrigation successive crops may be secured.

A noteworthy feature of the industry is its profitable by-products, both of which are in large demand. The use of the oil is increasing rapidly and the meal forms one of the best all round cattle feeds.

Regarding the principal cotton markets, Charleston, London, Liverpool and Germany should be mentioned, but the German field is practically untouched by American shippers. The Charleston market, although in the heart of the cotton growing district, appears to be the logical outlet for the Hawaiian fiber as it would there meet in favorable competition with the highest grades of cotton, which are unknown in other markets.

During Mr. Wilcox's trip he stated that after showing samples of Hawaiian cotton to mainland planters many requests for seed were received and much surprise was expressed when it was learnt that the mainland was the original source of our supply. Both with regard to Sea-island and Caravonica cotton, as good seed can be obtained in Hawaii as is possible to obtain from outside. In view of the great danger of introducing to Hawaii one of the devastating pests to which the industry is subject, the speaker urged upon all local growers to obtain their seed from the Hawaii Experiment Station and to do everything in their power to discourage and prevent the importation of seed from other sources.

In conclusion Mr. Wilcox said that everything considered, the planters of Hawaii had great encouragement to grow cotton as extensively as possible. With our immunity from pests, the great excellence of our fiber and its abundant yield, and the increasing demand for a first class article, the outlook for Hawaii with this crop is one of wide promise.

DR. SILVESTRI'S PAPER.

In addition to several local acknowledgments the FORESTER has received a letter from Mr. G. W. Herrick, Assistant Professor of Economic Entomology at Cornell University, in appreciation of the August issue, which contained a translation of a recent paper by the eminent Italian scientist, Dr. F. Silvestri. The August number of the FORESTER, in the absence of the editor at the Spokane Irrigation Congress, was prepared by Mr. Jacob Kotinsky.

FARMERS' INSTITUTES FOR WOMEN.

Already very efficient work has been effected in many mainland States by the establishment of institutes for women in conjunction with the regular Farmers' Institutes, for instruction in domestic science and household art among rural communities. The object of these organizations is to do for the woman in the home what the institutes are endeavoring to do for the man in the field, namely, to increase the efficiency of the individual and to cause her to take more intelligent interest in her occupation. This is brought about by instruction in domestic and sanitary science, the introduction of labor saving appliances and conveniences; and by an endeavor to bring about conditions whereby leisure and opportunity for social enjoyment can be secured by every family.

THE PROPER USE OF WATER IN IRRIGATION.

Address by Samuel Fortier, chief of irrigation investigations of the U. S. Department of Agriculture, at the 17th National Irrigation Congress, Spokane, Wash., August 12.

We are engaged in the stupendous task of making the United States of America more nearly symmetrical by building up the western half. For three hundred years the faces of the hardiest and the bravest of the race have been turned towards the West in a successful attempt at its subjugation and the effect of this westward trend has been to shift the center of power and of population from the Atlantic seaboard to within a short distance of the Father of Waters.

Measured by population, the progress made by the United States has been remarkable, but few realize how much the western half has gained in excess over the eastern half. The 96th parallel of longitude divides the union into two nearly equal parts geographically. From 1880 to 1900 the average rate of increase in population from the Atlantic coast to the 96th meridian was 44 per cent., while from the 96th meridian to the Pacific Coast it was nearly 144 per cent.

One can not lay too much stress upon the population of the western half of the nation, for in a region so vast and so full of natural resources of nearly all kinds, little can be accomplished without people and the assistance of the home builder is needed to give permanence and stability to commonwealths recently founded.

According to the latest and most reliable estimates, about 13,000,000 acres are being irrigated in the United States. Of this amount fully 95 per cent. is under private enterprises, something less than 4 per cent. being irrigated in 1908 by supplies furnished by the Government under its reclamation projects. This shows the magnitude of the task accomplished by Western pioneers and their descendants in reclaiming the arid lands of the West. It is to this class of irrigators that the Irrigation Branch of the U. S. Department of Agriculture and the various Western Experiment Stations are endeavoring to extend all the assistance within their power.

It has been a source of deep satisfaction to Western people and to all those who have taken an interest in Western affairs to observe the progress that has been made in irrigation during the past five years. The large investments in irrigation enterprises, the amount of work under construction and the extent of undertakings that are planned for the future place development along construction lines far in the lead. Water being the main essential in making barren soil highly productive, expensive channels must be dug for its conveyance and high walls of masonry built to hold back the floods to replenish the scanty flow of a later period. A

period of construction must always precede a period of use but the importance of the former should not detract attention from the latter. The building period is always the most popular because money is then being expended, often with a free hand, and the building of engineering monuments makes a strong appeal to the engineer and fires the imagination of the popular writer.

In addresses delivered before this congress at Boise in 1906 and at Sacramento in 1907, I tried to sound a note of warning against placing too much dependence upon the construction period of irrigation and too little on the period of utilization which is to follow. I tried to point out that reservoirs and canals are only expensive luxuries unless the water which they provide is fully and properly used. It is, after all, the labor of industrious farmers which determines the value of such properties. Furnishing an adequate supply to arid lands is an engineering problem, but the conversion of such lands by the use of water into productive fields and orchards involves a broad knowledge of many subjects and particularly that of irrigated agriculture. It is not beyond the region of probability to state that of the many irrigation enterprises now being constructed by private, state and National agencies, a certain percentage will prove financial failures. In case failure does result, it is reasonable to conclude that it will be due to the same causes which wrecked so many similar enterprises that were built between the years 1885 and 1895. Settlers are being lured to the West by the presentation of the bright side of irrigated farming, only to find when it is too late that a great deal of money and from one to several years of unprofitable toil are required to fit their fields for irrigation and intensive cultivation. Meanwhile the payments for both land and water have to be met and the expenses of operating and maintaining large systems intended to supply water to the many have to be borne by the few.

To insure success to the irrigation enterprises which are either completed or are nearing completion, the water which they provide must not only be applied to the soil by the right kind of settlers, but a reasonable amount of economy and skill must enter into its use. Water is by far the most valuable asset which the West possesses and if a large part of the natural stream flow is wasted there will be a corresponding shrinkage in the value of the products grown under irrigation. In a former address before this congress, I stated that only about one-third of the water which was diverted from streams and other sources of supply for irrigation subserved a useful purpose in nourishing plant growth. The balance is wasted in various ways, chief of which are through transmission losses from the source of supply to the place of use by poorly prepared fields, by unskillful application and by faulty water right contracts and water delivery. In the brief time at my disposal I shall endeavor to point out some of the means by which water can be conserved and put to an economical use. My purpose in calling your attention to these matters is not to impart

information. The time is too short for that, but rather to call forth brief and pointed discussion on the various points presented by those who have devoted thought and study to these subjects.

Since the time when water was first taken from the streams of the West for irrigation purposes up to the present, a period of over 50 years, a large percentage has been wasted by porous earthen channels. It may not surprise some of you to learn that the results of measurements on 73 canals of Western America by our agents show an average loss of $5\frac{3}{4}$ per cent. per mile of ditch. It is not true, as many contend, that the water which escapes through the bottom and sides of porous channels finds its way back through natural channels and is again diverted and used for beneficial purposes. There is, I believe, only a relatively small part which is thus utilized. By far the greater part is not only lost but it is worse than wasted since it collects, as a rule, at the lower levels of valuable lands, raises the water table, submerges the roots of crops, causes alkali to rise to the surface, and in general converts valuable fields and orchards into pasture lands of Bermuda grass and salt grass. The value of water is on the increase and farmers now are not infrequently called upon to pay over \$40.00 per acre for a water right. Instead of reaching out to the unappropriated water supplies of the West for fresh supplies to meet the ever increasing demands, it will prove a better investment to take measures to save a part of what is now appropriated.

The scarcity and high cost of water in some parts of the West have compelled water users to take steps to prevent losses in transmission. This can readily be done by canal lining since evaporation losses from the surface of a canal are small in proportion to the seepage losses. A number of different materials have been used for this purpose, consisting of heavy asphaltic oil, clay puddle, wooden flumes and cement concrete. In view of the high price of lumber and the inefficiency of petroleum oils, engineers are rapidly coming to the conclusion that concrete is the best material for such purposes. Cement and concrete linings have been applied to canals in thicknesses varying from three-fourths of an inch to six inches and more in thickness. A thin plastered coating can be applied at small cost. The cost of a lining of concrete from two to three inches in thickness will vary from 5 to $7\frac{1}{2}$ cents per square foot. This cost is not prohibitive and it will usually be found that if the water which it saves is properly used it will prove a good investment.

The use of concrete in lining canals to prevent seepage has led to its use in other irrigated structures, such as dams and drops, gates and division boxes, pipes and drains, culverts and bridges. This change from the use of wood to cement concrete has been brought about largely by the increase in the price of lumber and the corresponding decrease in the price of Portland cement. In building irrigation works some 25 years ago in Colorado, the imported Portland cement cost over \$8.00 per barrel, while the price

of native lumber of that State was quite low in comparison to what it is now. On account of the improvement in manufacture and the extension of the cement industry in western America, the price is now seldom more than \$2.50 per barrel. The low price of cement and the high price of lumber, as well as the greater desirability of concrete structures is bringing about a great change in irrigation practice and it would be well for water users to take advantage of these conditions by making permanent structures to replace those in wood. As our methods improve, irrigation systems will approach more nearly to those of domestic water supplies for cities. Instead of conveying water in open channels and flumes, a large part will be conveyed in pipes. Cement pipes of all diameters are now made but the forms used are expensive and clumsy. There is great need at the present time for cheaper and more serviceable forms which will enable farmers to make their own cement pipes in winter and at other slack times. What is true of pipes is also true of drains, culverts, bridges and all other structures which come in contact with the earth. In my own experience I have seen a 8x8 Oregon fir post wholly decayed in less than seven years. This may be an exceptional case, but wherever timber is placed in contact with the earth its life is at best short.

I have referred to the large amount of money which is being put into irrigation enterprises and to the extent and cost of the construction now under way. In a comparatively short time these systems will be completed and their success will depend in no small degree upon how they are managed. For a great many years the railway corporations of this country have given much more consideration to operation and maintenance than to construction and the result has been the accumulation of data and experience which have proved invaluable. In the case of irrigation enterprises little information is available. We have devoted our best energies to construction and disregard that part which relates to operation and maintenance. Although thousands of miles of canals have been built, it is well nigh impossible to ascertain at the present time the cost of maintenance and operation per mile of canal on even a small percentage. This subject is so broad that I can only touch upon its various branches. There is, in the first place, the organization of irrigation enterprises. What kind of organization is best adapted to particular conditions? Which will come nearest to meeting the needs of the farmers, the coöperative companies, the capitalistic canal company or the irrigation district? Shall we attempt to reclaim lands by means of the Carey Act in which the individual, the State and the Nation all coöperate, or shall we allow the Government to act as both our banker and contractor and give us the privilege of footing the bills? Of the many kinds of organization now in operation, it is no easy task to determine which is best for a particular set of conditions.

Then having decided upon the proper kind of organization, what procedure is necessary in order to make the preliminary investiga-

tions? Which is the best and cheapest water supply? How much water is required to irrigate an acre of land? What grades shall be given to the channels in order to avoid erosion on the one hand and sedimentation on the other? How soon may settlers be expected to utilize both land and water and what form of water contract will deal justly with both company and water user? In the matter of operation and maintenance there is a broad field of inquiry which has been scarcely touched upon. Each canal superintendent pursues his own methods but the work has never been systematized as it has been on transportation lines. The delivery of water to users is still a question of guess work as few accurate measurements have been taken. And lastly, but not least, how are we to make the revenue balance the expenses?

Earnest efforts have been made during the life of irrigation in the West, to devise accurate and at the same time reasonably cheap and efficient devices for the measurement and division of irrigation water. Many methods have been employed and each has its own set of supporters, but there is still a widespread discontent concerning our best measuring devices and it is hoped this discontent will lead to further efforts in this direction which may result in the adoption of methods that will more nearly meet the requirements. The current meter has been found a useful instrument for the measurement for streams and canals, but its use has been confined largely to the engineering profession. Wires of both the rectangular and Cipolletti forms have also been largely used and have proved a reasonably accurate method except where silt and other debris have interfered with the accuracy of the results. Many prefer the submerged orifice of one kind or another and I know of several men who are now at work in attempting to devise some kind of a water meter which will answer the purpose.

Although we can not boast of our modes of measuring water, yet a measurement which comes within five per cent. of accuracy is much better than no measurement at all. The bulk of the irrigation water used in the United States is now divided by guess work and it is impossible for even the most experienced to make a close guess. Many have long felt that the lack of accurate measurements is one of the chief causes of waste throughout the arid regions.

There is another phase of this subject which is productive of great waste. I refer to the system of proportioning water for canals on an acreage rate. So long as users are permitted by their water right contracts to as much water as they consider necessary to irrigate an acre of land, there can be no economy. Whenever there is a full canal, those under it will endeavor to utilize as much as possible for their respective needs. This wasteful method has resulted in an effort to have land and water inseparably connected. The doctrine has been preached in every hamlet of the West that water must be appurtenant to the land irrigated, and in an effort to conform to this doctrine, the bulk of our appropriated water

has been decreased to definite areas of land. This principle has much to recommend it and little objection could be raised to its application, providing a fixed quantity of water would always meet the requirements of a definite area of land. Every one knows though, that the amount of water required varies from year to year and under a score or more of conditions. New land which may require four or five acre feet of water may become so moist in time that it will not require one acre foot per season. The irrigation laws patterned after those of Wyoming are regarded as the best yet; in some of the Rocky Mountain States in which such laws are operative, we frequently find the most wasteful use of water amounting in several cases to over ten acre feet per season.

On the other hand, California gets the name of having the worst laws with regard to irrigation, yet throughout Southern California water is more economically used than in any other district of the arid West. I mention these facts not for the purpose of overthrowing the law of making water appurtenant to the land irrigated, but rather for the purpose of showing its shortcoming when regarded in the light of an economical use of water. Many now contend that the only way in which water can be economically used is to measure out the amount to which each farmer is entitled, and permit him to make the best possible use of what he has purchased. If it is to the interest of water users to save the water which they receive from canal companies, the water now used and wasted on western lands will cover a much larger area.

In the arid and semi-arid portions of the United States, there are over 1,000 million acres and out of this it will not be possible, on account of the limited water supply to irrigate more than about 50 million acres or one-half of one per cent. of the total. From this statement it is not difficult to predict what will happen in the course of time if on the average only one-half acre out of every 100 acres can be irrigated. It will mean, I believe, that the irrigated portion will become extremely valuable. The best orchard lands on the Pacific Coast frequently change hands at from \$1,000 to \$2,000 per acre and this, it seems to me, is but an indication of the high values which will be reached by other portions. It is not going to pay the irrigator to raise much grain under the ditch. He must devote such lands to more profitable crops, and these crops, in order to be profitable, must be well irrigated and intensely cultivated. Only a comparatively small percentage of the irrigated farms in the West have been properly prepared for irrigation. More attention must be given to this phase of the subject. The opinion has been prevalent that when a water right is secured and a farm purchased, the chief sources of expense and trouble are over. This has not been the experience of the average irrigator. He finds as a rule that the first few years after sage brush or the removal of other desert plants, little returns can be derived from the soil. He must wait for years for the most profitable crops to mature, and in the meantime he is under great expense to so fit the land that it will give him the expected returns.

It would seem a simple matter when fields are properly prepared to apply sufficient quantities for the needs of cultivated plants, but although we have been practicing this art for half a century, we have not yet learned the whys and the wherefores. Perhaps the chief difficulty which has arisen to prevent the improvement of methods consists in the wide varieties of soil and crops and our lack of knowledge of the needs of the plants. If the plants could only talk and tell us when they are suffering, we could do much better but our methods are still extremely crude in determining the amount of moisture in soil, the amount required by the plant and the stages when it is beginning to suffer from drought. In attempting to apply water we have little knowledge of the quantities needed by the crop at particular times and of the proper time of application. There is a wide field for investigation along this line and it must be carefully studied before it can be said that we have laid the foundation of scientific irrigation.

The duty or service which water can perform in irrigation has always been given a prominent place. It was so in the early days when water was both cheap and abundant and its importance has increased as water has become scarcer and of greater value. There is so much more irrigable land in the West than can ever be irrigated that much of our agricultural development in the future will hinge on the amount of water required for irrigation. The subject, as you know, is one which reaches out into many branches of irrigation. We may measure the water as it is diverted from the natural streams and obtain what is called the gross duty of water. We may measure it at the head of a lateral and determine the duty of water under laterals. We may measure it at the margin of a field and find out the amount of moisture applied to the soil, or we may study the crop and find out its requirements as regards duty of water. You will be pleased to know that water has now a much higher duty throughout the West than it had formerly. Largely through the efforts of the Irrigation Investigations of the Office of Experimental Stations, U. S. Department of Agriculture, excessive uses of water have been measured and pointed out and as a result better crops are now grown with much less water. There is, however, great need of continuing these investigations, since we find that the average duty of water over two-thirds of a million acres of land was recently shown to be $4\frac{3}{4}$ feet per acre. Assuming an average rainfall of 15 inches, this would represent a total of 6 feet of water in depth over the surface. A considerable part of this is, of course, wasted before it reaches the field but an effort has been made, as I have previously stated, to reduce transmission losses as much as possible.

The people of Southern California have demonstrated that excellent crops of all kinds can be obtained with the use of 3 inches of water per month, including both irrigation and rainfall. This is a district in which plants grow practically the year through and in which evaporation losses are high. If such results can be obtained in Southern California, considerably less water, if applied

as economically ought to satisfy the crops of the Rocky Mountain States. It is possible, I believe, to reduce our average duty from $4\frac{3}{4}$ per acre to 3 feet without in any way lessening the yields.

While the chief work of our office during the past ten years has been the prevention of waste of water, we have also tried to assist in the solution of the many problems which have arisen and are continuing to arise in connection with its proper use. A few years ago, our office published a little work on the preparation of lands for irrigation and methods of applying water. The demand for this bulletin was so great that edition after edition had to be printed. We have now decided to issue a series to take its place. The first of this series, *The Irrigation of Alfalfa*, is now in press, and others will follow as speedily as they can be published. The series will comprise seven bulletins, the irrigation of alfalfa, sugar beets, orchards, grain, rice, potatoes and small fruits. In addition to what has already been published, our agents are preparing practical manuals on windmills, pumping plants, small storage reservoirs, concrete structures in irrigation, the delivery of water to irrigators and the management of irrigation enterprises.

Our office has likewise joined hands with the state engineers and other prominent state officials of western states in the publication of a series of state reports on the irrigation conditions of these respective commonwealths. Professor O. L. Waller is the author of the report of this State and I feel certain that no one can read that report without having broader conceptions of the irrigation possibilities of this young giant—the State of Washington.

These reports, coming as they do from the highest authorities on irrigation conditions in the west, will serve, I believe, a useful purpose in correcting erroneous ideas which prevail in the East and Middle West regarding irrigation. There the belief is common that little or nothing was done in the way of irrigation until the Government took hold of it and that all the works of any consequence have been built by the Reclamation Service. These reports show that practically all the irrigated products are as yet derived from lands under private enterprises of one kind or another, such as the coöperative canal company, the irrigation district and the State acting under the Carey Land Act, and that as I have stated fully 95 per cent. of the present irrigation area lies outside the Government projects.

The purpose of the reclamation laws was to supplement the efforts of private enterprises and it will continue to serve this purpose during the life of the present generation.

Such being the facts, this Congress, it seems to me, should use every legitimate means to encourage and extend the work done under private enterprises so that they may reach to higher standards. The problems of irrigated agriculture are being solved chiefly by the more intelligent and progressive irrigators, but in addition to this, the Western experiment station worker and the

nts of the Irrigation Investigation of the Department of Agriculture have rendered services of a kind which no money value measure.

It is for you members of the 17th National Irrigation Congress support and encourage the efforts of these various agencies so that fertile lands and valuable water may yield the highest possible tribute to the farmer.

RECLAMATION ACT.

The bill now before Congress, referred to by Mr. Mendenhall, in his address before the Social Science Association, is as follows:

76th Congress,
2d Session.

H. R. 25141.

IN THE HOUSE OF REPRESENTATIVES.

January 4, 1909.

Mr. Kalaniana'ole introduced the following bill; which was referred to the Committee on Irrigation of Arid Lands and ordered to be printed.

A BILL

To Extend the Provisions of the Reclamation Act to the Territory of Hawaii.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the provisions of the Act entitled "An Act appropriating the receipts from the sale and disposal of public lands in certain States and Territories to the construction of irrigation works for the reclamation of arid lands," approved June seventeenth, nineteen hundred and eight, be, and the same are hereby, extended so as to include and apply to the Territory of Hawaii; and the appropriate officers of said Territory are hereby authorized and directed to perform all such necessary and proper for complete coöperation with the Secretary of the Interior in carrying out the provisions of this Act, and also for securing from the proceeds of the sales of land that may be reclaimed under said project, full repayment to the reclamation fund of the expenditures therefrom on account of irrigation projects in said Territory.

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

ROUTINE REPORTS.

DIVISION OF FORESTRY.

Honolulu, Hawaii, September 30, 1909.

Board of Commissioners of
Agriculture and Forestry,
Honolulu.

Gentlemen: I have the honor to submit herewith the regular report of the Division of Forestry for the months of August and September, 1909.

NATIONAL IRRIGATION CONGRESS.

For the seven weeks from July 28 to September 14, I was away from Honolulu, detailed on the special mission of officially representing the Territory as a delegate at the Seventeenth National Irrigation Congress at Spokane, Washington, August 9 to 14, and also at the First National Conservation Congress at Seattle, Washington, August 26 to 28.

The special purpose in view in having Hawaii represented this year at Spokane was to secure the endorsement by the National Irrigation Congress of a project for which the officials of the Territorial Government are earnestly working—the extension of the Federal Reclamation Act to Hawaii. To every one who gives even passing attention to the needs of Hawaii, it is apparent that efficiently to fulfill the duties that are placed upon it by the Nation, this Territory must have an increase in the number of its American homes. Many attempts to secure desirable settlers have been made in the past, but the need remains. It now appears that through the reclamation by irrigation of certain of the semi-arid public lands on each of the larger islands of the group, opportunities can be made that will attract to Hawaii people of the sort that we most need, that is provided that along with the opening up of new lands there can also be secured improved conditions of transportation and better facilities for marketing local products.

But the task of reclaiming the areas where such development is possible is a big and expensive one—too costly for this little Territory to hope to carry out successfully with the limited funds that are available in the regular channels. To finance such a project as this, help must be sought from other sources. The most obvious solution of the problem is the extension to Hawaii of the Federal Reclamation Act of June 17, 1902, under which similar projects are being successfully carried out in the states and territories west of the 100th meridian and in Texas, in which state conditions are in many ways similar to our own.

The extension of the Reclamation Act to Hawaii can only be secured by a special act of Congress. To secure action by Congress requires influence and hard work. In all matters pertaining to irrigation the recommendations of the National Irrigation Congress carry much weight. The object of the Hawaii delegation at Spokane was therefore to secure the adoption by the Irrigation Congress of a resolution favoring the extension of the Reclamation Act to Hawaii. This we were successful in doing, thus gaining one point in the long and up-hill struggle that must be made to secure the desired action by Congress.

Hawaii was represented at the Irrigation Congress at Spokane by a delegation of six members: Messrs. A. F. Knudsen, J. T. Taylor, W. H. Babbitt, L. G. Blackman, Harold Lord and R. S. Hosmer. Meeting at Spokane on Sunday and Monday, the 8th and 9th of August, the delegation at once organized, selected members for the several committees of the Congress on which Hawaii was entitled to be represented, and arranged for a systematic campaign to secure the support of committee men and delegates from other states for our resolution. A Hawaii headquarters was established where maps and literature illustrative of Hawaii were freely given out. On August 11 I made a twenty-minute address on "What Reclamation Means to Hawaii," which was well received and seemed to elicit considerable interest. This address has been published locally. It has also appeared in full on the mainland in the "Louisiana Planter" and in the "American Sugar Industry and Beet Sugar Gazette"; in the former accompanied by editorial comment to the effect that in the opinion of that journal, Louisiana was more in need of settlers than was Hawaii.

It was a pleasant surprise to find that Hawaii already had so many friends. Needless to say we did what we could to add to that number. To Mr. F. H. Newell, Director of the U. S. Reclamation Service, are due special thanks. By suggestion and encouragement he was a constant source of help. Indeed without him Hawaii would hardly be engaged in the present quest. In this connection special mention should also be made of the cordial interest and helpful support accorded the Hawaii delegation by ex-Governor George C. Pardee of California and by Dr. W. J. McGee, of Washington, D. C. As president and secretary, respectively, of the resolutions committee these gentlemen were in positions where their friendly aid counted for much—and both gave it freely.

The resolution concerning Hawaii adopted by the Seventeenth National Irrigation Congress on August 13, 1909, is as follows: "We urge the Congress of the United States to extend the Reclamation Act to the Territory of Hawaii."

NATIONAL CONSERVATION CONGRESS.

Following up the advantage gained at Spokane, representatives of Hawaii also secured the adoption of a favorable resolution at

the First National Conservation Congress held at Seattle, August 26-28. Mr. A. F. Knudsen and I were the delegates. We both had places on the program. Mr. Knudsen's paper, entitled, "The Waste of War," was read by title. On August 27 I read an address on "The Progress of Conservation in Hawaii."

Being a newly formed organization the National Conservation Congress naturally has not as yet the standing or importance of the Irrigation Congress, but it is a body that is bound to be heard from. For this reason it is of value that among the resolutions adopted on August 28, at its initial session, should be the following in regard to Reclamation in Hawaii:

"Since the Territory of Hawaii is approaching the limit of its ability to develop the natural resources along the usual industrial lines and would be enabled to increase materially the number of American homes through a comprehensive system of irrigation, we urge the Congress of the United States to extend the Reclamation Act of June 17, 1902, to that Territory."

HEARING BEFORE SENATE COMMITTEE.

A few days after the Conservation Congress, we were enabled, through the good offices of Mr. F. H. Newell, to appear in Seattle before the U. S. Senate Committee on Arid Lands, then en route on a tour of the West, to present arguments and file briefs in support of the extension of the Reclamation Act to Hawaii. It is before this Committee that the bill to secure this action, introduced last January by our Delegate to Congress, and reintroduced at the beginning of the present session, is now awaiting consideration. The members of the Senate Committee present in Seattle were Senators Thomas H. Carter, of Montana, chairman; Francis E. Warren of Wyoming, Thos. H. Paynter of Kentucky and George E. Chamberlain of Oregon. Senator Samuel H. Piles of Washington, though not a member of the committee, was also present. In him Hawaii has a good friend, one of the results of the visit of the first Congressional party. Among other friends of Hawaii at the hearing were Mr. Newell and Dr. McGee.

At this hearing, which came on August 30, I read a statement of reasons, which was later filed as a brief, together with Mr. Newell's report. Remarks were also made and questions answered by Mr. J. P. Cooke, who fortunately happened to be in Seattle. Altogether the hearing was distinctly satisfactory. We had as fair a chance to present our case as we could ask and while of course nothing definite can be said of the result, we had reason to feel that an additional point had been gained for our project. What we were able to do this summer is of course but a beginning in a long campaign but at least the start has been made.

HAWAII AT THE FAIR.

During my stay in Seattle I was able in some measure to lend a hand at the Hawaii building at the Alaska-Yukon-Pacific Ex-

position. I spoke two or three times in the biograph room and was on hand on Hawaii Day to help work up interest in the islands. From what I saw of the activities of the Hawaii Commission I believe that the money expended for the Hawaii exhibit is one of the best investments that this Territory ever made. The Hawaii exhibit is a distinctly creditable collection, truly representative of the islands. The Hawaii building has been so managed that it has unquestionably been one of the main features of the Fair. All this can but result in benefit to the islands in many ways.

OTHER OPPORTUNITIES.

While on the mainland it was a privilege as well as a pleasure to see not a little of a number of other foresters, both men in the U. S. Forest Service and those in the employ of States. I was particularly fortunate in this regard, seeing at Spokane and Seattle Forest Service men from Washington and the Eastern States, as well as those regularly stationed at Portland, Sacramento and San Francisco. Incidentally I was able to make a couple of side trips into National Forests in Idaho and Washington. From these experiences I bring back to my work here new ideas and profitable suggestions.

EUCALYPTUS INVESTIGATION.

One very practical outcome of the conferences with the Forest Service men in San Francisco is the assignment of one of the technically trained assistants from that office to an investigation of the planted Eucalyptus forests in Hawaii. It has long been my desire to undertake a study of the rate of growth and the yield of the Eucalyptus groves that have been planted in this Territory, for I am sure that the results of such a study, by making available concrete figures of just what can be expected, will be convincing proof of the advisability of extensive forest planting. It is proposed that the cost of this investigation be borne jointly by the Territory and by the U. S. Forest Service, the latter's share to come out of the allotment that has this year again been secured for experimental planting in Hawaii. It is probable that the assistant from San Francisco will arrive in Honolulu soon after December 1, when fieldwork will at once be begun.

PREPARATIONS FOR ARBOR DAY.

Since my return to Honolulu on September 14 I have been engaged with the routine work of the Division of Forestry, especially in connection with preparations for the free distribution of large numbers of trees on Arbor Day—November 12. As outlined in previous reports it is planned to give each person in the Territory, who owns or controls a homestead, kuleana or other tract of land and who desires to plant trees, two dozen seedling trees, free, delivered to some central point near his home. To facilitate the distribution sub-nurseries have been established. At

these points and at the Government Nursery at Honolulu, enough trees are being got ready to fill all requests that are likely to be made. During the past week letters have been sent to various correspondents of the Division throughout the Territory requesting their coöperation in making up lists of names of persons who desire the free trees. Notice of the free distribution has also been given through the English, Hawaiian and Portuguese newspapers. In these ways it is hoped that no one who really wants trees will be overlooked when Arbor Day comes. Until the second Friday in November the energies of the Division of Forestry will continue chiefly to be devoted to this work.

CONSERVATION MEETING.

On Wednesday afternoon, September 22, under the auspices of the local branch of the Woman's National Rivers and Harbors Congress, a public meeting was held in the rooms of the Commercial Club, where Mr. W. C. Mendenhall of the U. S. Geological Survey and I read papers on conservation. The purpose of both addresses was to bring clearly before the meeting a brief statement of the place that conservation bears in certain of the problems that now loom large before us. Mr. Mendenhall spoke on "Conservation in Its Relation to Water Investigations." My paper was entitled "Conservation in Hawaii—Its Present Status and Its Aims."

BOTANICAL EXPEDITION TO KAUAI.

From August 31 to October 3, Mr. J. F. Rock, the botanical assistant of this Division was on Kauai, engaged in collecting herbarium material on the uplands on the south side of that island. Through the extreme courtesy of Mr. Francis Gay Mr. Rock was able to get much interesting material, illustrative of a particularly interesting botanical locality. During his stay on Kauai Mr. Rock made the ascent of Mt. Waialeale, bringing back a good collection of specimens from that inaccessible and seldom visited mountain peak. These are now being prepared for their permanent place in the herbarium at the Board's office at the Government Nursery.

RETURN OF MR. HAUGHS.

In accordance with a leave of absence granted him by the Board, Mr. David Haughs, Forest Nurseryman, was away from Honolulu on a well merited vacation from September 2 to September 28, during which time he made a flying visit to San Francisco.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

THE HAWAIIAN FORESTER AGRICULTURIST

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AGRICULTURE IN CHINA AND JAPAN.

The recent mission of a representative of the Hawaii Experiment Station to China and Japan in the interests of our island agriculture, more particularly with regard to the cotton and rice industries, is an important one and its results are likely to be of far-reaching benefit to Hawaiian growers. The increasing Oriental population in the islands creates a large demand for rice, but although the local grown product is of good quality it fails to appeal to the Japanese who find its flavor not acceptable. In order to supply the demand for Japanese rice, over three-quarters of a million dollars worth is imported annually to these islands, which large sum is therefore lost to our growers. Many attempts have been made to grow rice from Japanese seed, but hitherto that produced has been lacking in those qualities which make it appeal to our local consumers. Attempts of a like nature carried on in other countries have also met with the same lack of success.

The two most desired varieties of Japanese rice are known as Omachi and Shimriki and are grown in the Kiushiu and Yamaguchi districts, from whence come most of the Japanese laborers in the Hawaiian Islands. The securing of select seed rice from these localities was one of the chief objects of the recent undertaking of the Hawaii Experiment Station together with an investigation of the cultural methods in operation in the Orient, for as is well known, the Hawaiian rice fields have long yielded decreasing crops, steadily deteriorating in quality.

CANTON.

Leaving Honolulu early in August last, Canton was the first agricultural center visited. The surrounding country yields an enormous quantity of rice and is the source of the famous variety known as See-miu, the best grades of which are grown in the Tsang Shang districts. This rice is greatly prized for curry and commands a high price in the San Francisco market. It would without doubt be a very remunerative crop here. So carefully is the local industry guarded that the exportation of See-miu seed rice is prohibited, although it is frequently smuggled into Canton.

Through the courtesy of the officials the Hawaii Experiment Station has been fortunate in securing a small quantity of select seed which will be very useful for experimental work here.

In the neighborhood of Canton is also situated a great mat-rush industry. This plant, *Cyperus tegetiformis*, is already introduced in the Hawaiian Islands where it grows readily. It occurs indigenously in China and is also cultivated in marshes along the banks of rivers. It is frequently grown in rotation with rice and is suggested as a possible substitute for this crop in these islands, in situations too saline for the cereal.

A little cotton is also produced around Canton, but is very inferior both as to quality and yield. Although the agricultural methods of this crop are primitive and crude the mills are equipped with modern machinery.

A very promising government experiment station is in operation at Canton and although it has only been established about one year, much progress has been made. Its director is a Chinese graduate of Cornell, and the institution itself is patterned after that at the latter university.

Lining both sides of the Canton river are groves of the well known Lichi which flourishes with little or no care. The fruit is sold very cheaply and great differences of quality are encountered.

FERTILITY OF RICE FIELDS.

Although the Canton rice fields have been in cultivation for upwards of a thousand years and produce two to three crops annually they are abundantly fertile and show no signs of decreased crops. No artificial fertilizers are employed, but all refuse is most carefully made use of, night soils being the main source of supply. Sea weed, fish and ooze from canal bottoms which are regularly scraped for this purpose also afford much of the fertilizer for the Chinese rice fields. As much of the agricultural land of this district is embraced in the overflowing delta of the Canton river it is to a certain extent naturally fertilized.

CONSERVATION OF REFUSE.

One of the most striking lessons to be learnt from an enquiry into the economic life of China is the system by which the ultimate value is derived from all waste. This is greatly exemplified in the case of agricultural fertilization. Not only do cities control and auction the privilege of disposing of public sewage, but land-owners maintain along the highways earthen receptacles for the convenience of travelers. It is not extravagant to assert that were modern sewage methods introduced into centers of population in China, many cities would in a very short time be reduced to a condition of famine by reason of crop diminution. Although China is considered as an overwhelmingly populated country it would seem as if large cities there are largely independent of

outside food supply, as they create around them immense areas of wonderfully productive land sufficient for their own support. If this be true the ultimate overpopulation of the globe must be deferred to a time more remote than that generally accorded it by current opinion. In view of the general movement towards conservation of resources throughout the world it would be well if other countries devoted thought to what China is doing with regard to the conservation of soil fertility.

SHANGHAI.

In the neighborhood of Shanghai much cotton is grown, but it is of inferior yield and poor quality. As land and labor are both cheap a small profit is, however, made. The seed is here sown

IMPERIAL EXPERIMENT STATION, JAPAN

broadcast and the plants are set in narrow beds from six to twelve inches apart.

The chief agricultural region of Central China is situated around Hangkow, which unfortunately at the time of visit was inaccessible on account of heavy floods, which in some cases reached a depth of forty feet. In consequence of this misfortune an enquiry at first hand into the agricultural conditions of this wealthy region had to be abandoned.

CHINESE AGRICULTURAL METHODS.

In general the land holdings throughout China are small but very highly cultivated. The vast majority of agricultural land is cut up into small parcels of from a fraction of an acre to two or three acres in extent. The most antiquated tools are used and

primitive methods are in operation. As a rule hand tillage is seen, but occasionally bulls and small horses are met with. A small neat milch cow, said to be an importation from Korea, appears to fulfil the service required. In spite of the thousands of successive crops which have been taken from the land, no sign of deterioration is encountered. The highly tilled areas surround the cities which are generally situated upon large rivers. Silk, rice, cotton and tea are the staple agricultural industries of China, but the latter is more and more losing ground in consequence of competition with Ceylon tea. Russia is the chief consumer of the Chinese beverage. Vast tracts of valuable agricultural land are yet uncultivated in China and need only irrigation and fertilization to be as productive as the older worked lands. Throughout the country the impression was created of a vast country yet awaiting development.

JAPAN.

Passing to Japan the agricultural conditions were found to be very different from those recently encountered. The region south of Tokio is the most fully cultivated and affords a revelation to the traveler of the possibilities of agricultural development. It may truly be said that Japan is one vast garden in the highest state of cultivation.

To rice alone over three million acres are devoted, cut up into farms of from one to five acres. On account of climatic conditions only one crop of rice and another of wheat or barley are grown annually, the rice being harvested in the fall and the rotation crop in the spring.

EXPERIMENT WORK IN JAPAN.

In contrast to China, Japan possesses a splendidly equipped Department of Agriculture. The main imperial experiment station is situated at Nishigahara, near Tokio, where a staff of thirty specialists is in operation. Many of the employes have received foreign education and the research work is of a high order. Each of the forty prefectures of the Empire has a special agricultural demonstration station. The main lines of investigation center around rice, tea and tobacco. The latter crop is a government monopoly.

JAPAN AND COTTON.

Ten years ago there were upwards of fifty thousand acres of land devoted to cotton cultivation in Japan, but this has fallen off to less than one thousand. The chief reason for this is found in an unfavorable climate, but it is significant when it is remembered how the supply of most cotton countries is diminishing.

CLASSIFICATION OF RICE.

The rice investigations carried on in Japan are foremost of those of any other country. At Kinai, near Osaka, is situated an experiment station entirely devoted to rice breeding. This station recently undertook the colossal work of collecting and classifying all the varieties of rice grown throughout the Empire. For this purpose all available rices, embracing over four thousand different lots, were collected and compared. By the system instituted, duplicates were eliminated and the residue were separated into varieties. As the result of six years' labor all Japanese rices were classified into six hundred and sixty distinct stocks. From these pedigreed seed is grown and distributed throughout the Empire.

RICE EXPERIMENTS. POT CULTURE

RICE BREEDING.

As has been said the research work is of a very intelligent order. The breeding principles of Mendel and the mutation theory of De Vries are both thoroughly understood and applied. The evolution of new rices is brought about either by straight selection of approved specimens or by artificial hybridization. During this present season upwards of ten thousand crosses were effected. At first these operations were conducted with indifferent success and brought about most indefinite results. At the present time the methods are much better understood and so far controlled that about thirty per cent. of crosses are effective. In the rice trial grounds over two thousand distinct cultures were in operation, ranging from small groups of about twelve plants to plots of several rods in extent.

FERTILIZATION EXPERIMENTS.

Very extensive fertilization experiments are being undertaken chiefly by means of pot culture. Much original work is being done in this direction. Comparatively little chemical fertilizer is used, the chief source of manure being oil cake meals. Of these the most important are cotton, rape and soy. Night soils and all animal manure are most carefully applied. Green manuring operations are also understood and very generally employed. The chief of these, a kind of clover, is known as 'Genge' (*Astragalus sinicus*) and is almost universally employed. The soy and common broad bean are also occasionally used for this purpose.

GENGE.

The Genge seed is sown broadcast among the rice in the autumn just before the crop commences to mature. By the time of rice harvest, the genge has germinated and is well started. It is then mulched with straw and under favorable circumstances makes a luxuriant growth by the following May, when it is ready to be turned over. If the genge crop is heavy one acre of this plant is sufficient to green manure four acres of rice. Fortified by the use of composts it forms one of the chief fertilizers of the Empire. If the lands are lacking in certain constituents a suitable quantity of oil cake meal is used in addition. After hundreds of years of successive cropping, the Japanese rice fields are by the above means rendered more productive than ever.

INSECT PESTS.

Several serious diseases and insect pests menace the rice industry in Japan. The imperial government maintains an experiment station solely devoted to this department of research. Stringent control measures are in operation and have done much to check the spread of pests.

Stem borers do considerable injury to the rice industry. Two types are conspicuous and when they become established are liable to destroy half the crop. They are fortunately affected by parasites or their ravages would be very excessive. The control of plant diseases being under government control the burning of infested crops is insisted upon by law. After harvest the insect retires to the root of the plant and the stubble being burnt much benefit is derived from this measure.

BLIGHTS.

Several blights occur which are liable to cause much injury to the rice crop. Of these may be mentioned a disease which causes

dwarfing of the whole plant. It is associated with a small hopper which is regarded as the source of infection, although the nature of the disease is little understood. The usual mode of remedy is to treat the paddy fields with petroleum and to brush off the insects from the surface. Smut is prevalent in some regions.

GENERAL.

Throughout Japan a general dearth of domestic animals is noticeable, although considerable advance is being made in the practice of modern dairying. One agricultural station has a special apiary department and is introducing better methods in this industry.

RICE EXPERIMENT FIELDS

The chief factors lying at the basis of the success of the Japanese rice industry are believed to be the system of fertilization, especially as regards green manuring, and a thorough understanding of plant rotation. Rice hay is not known in Japan, but rice straw is valued for the manufacture of rice-bags, mats, ropes and for thatching purposes. It occasioned some surprise to learn that no rice bran is fed to live stock, but that all this enormous by-product is used for fertilizing. By the operation of milling a small quantity of rock powder, detrimental to cattle, is left, which sufficiently accounts for its non-use for feeding purposes.

GENERAL RESULTS.

The visit to China and Japan has resulted in securing a quantity of rice and other plant seed, some of which promise to be

valuable as rotation crops and as green manure. A careful study of the various cultural methods in the leading rice country of the world has given much valuable information which will be of practical utility. One especially pleasing feature of the visit was the generosity and kindness with which the Hawaii Experiment Station's representative was received by the Japanese officials. Every assistance was rendered to make the mission successful, and not only were seeds and official publications given, but the members of the staffs of the various agricultural stations readily gave whatever information was desired and devoted much pains to be of use.

FOREST FIRES AND THEIR CONTROL.

The following tabulated methods by which the Federal government checks fire losses of the National forests should be closely studied and as far as practical put into operation by all owners of timber land:

1. Constant and systematic patrol by picked forces of rangers and guards;
2. The construction of roads, trails, and telephone lines, which facilitate the massing of large fire-fighting forces;
3. The construction of fire lines which, in some instances, check the spread of fire without human help;
4. The equipment of the forests with fire-fighting tools and other supplies necessary in fighting fires;
5. Coöperation with railroads and adjoining timber land owners, and settlers to protect both the lands of the companies and the Forest Service at a much smaller cost to the individual owners than would be the case were the National Forest lands alone protected by the local officers.

INSECT PEST REMEDIES.

The Forester is in receipt of a pamphlet from a local drug house which urges the necessity of controlling plant crops by spraying and contains a list of standard sprays with practical directions for their use. It is to be hoped that the enterprise of the firm will meet with sufficient response to justify continued advertising on these lines, as the more publicity given to the value of such remedies the better for the appearance of the Honolulu gardens. It would no doubt repay a business house to instruct a special employee to devote himself to the educational side of this question and to make owners of house lots alert to the importance of keeping fruit and other trees free from pests. By advertising that such an employee was ready to visit persons desiring instructions in spraying and to give demonstrations and advice as to best methods of insect destruction there is no doubt a large clientele could be procured.

ACID PHOSPHATE.

A PAPER READ BEFORE THE AGRICULTURAL SEMINAR.

By C. C. JAMES.

For the manufacture of good commercial acid phosphate from phosphate rock two things are absolutely necessary:

1st.—Fine grading of the rock.

2nd.—Correct proportioning of the rock and acid.

As the rock coming from the mine contains large pieces and hard lumps it must be crushed first and put into the proper condition so that it may be easily acted upon by the sulphuric acid. The rock as it comes from the cars is passed through a jaw crusher which brings it down to the right size for feeding to the pulverizer mill.

PULVERIZERS.

There are a number of mills, such as the Bradley, Fuller-Lehigh, Sturtevant, etc., which are guaranteed to do the work in the shortest time and with the least power, but each industry has to find out from experience which is the best mill for its individual purpose. In some operations a very fine granular material is desired with as little powder as possible; in others an impalpable powder is of particular importance, for instance, in the cement industry. But for the manufacture of superphosphate, a material is required which will be sufficiently fine to pass a 60-mesh sieve and yet not be composed entirely of powder. A cement-like powder would be difficult to mix with the acid for the reason that the particles are so fine and set so closely together that it is not at all porous. As soon as it is stirred with the acid the reaction goes on rapidly at the surface and forms a coating of acid phosphate and gypsum around the pulverized rock leaving a core in the center perfectly dry and unacted upon. On the other hand if the rock has not been ground sufficiently a similar condition is brought about. Moreover the resultant acid phosphate is wet and unfit for use due to the fact that the reaction goes on so slowly that there is not sufficient heat generated to evaporate the excess moisture.

The ideal material would consist of a mixture of flour-like powder and small rock particles which under the microscope would look like a mass of very sharp, jagged, and uneven rocks. The more torn and crushed is the appearance the better the material is for acidulating purposes.

BUHR STONES.

The Buhr stone mill, possibly the oldest type of fine grinding mill, is still used extensively and the material produced is very

satisfactory. The mill consists of two heavy stones of a flint-like character which are set horizontally so that a driving shaft through the center revolves the upper stone over the face of the lower one. The faces of the stones are dressed in grooves running in opposite directions so that when the upper stone revolves they come together in the manner of a pair of shears. The rock to be crushed is fed between the stones where it is subjected to a crushing, tearing and grinding action all at the same time.

COMPUTATION OF ACID.

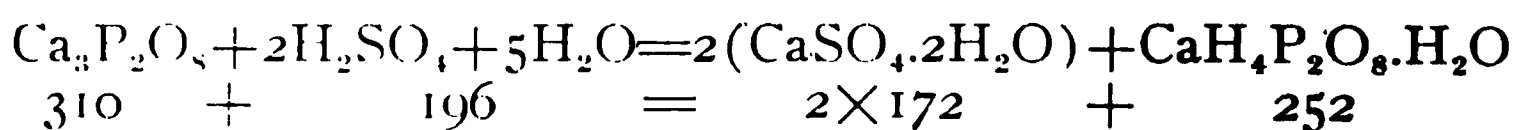
In order to compute the sulphuric acid necessary for the formation of acid phosphate the chemical composition of the rock must be known. Very often the complete analysis is not made, but only the more important tests for phosphoric anhydrid, iron alumina, carbonates, and sometimes magnesium and flourine. From time to time tables have been made which are supposed to show at a glance how much acid of a certain strength should be used, but as there are very often other problems to consider than the removal of just so many parts of the bases involved, their use is not at all times helpful and is certainly not economical.

CHAMBER ACID.

What is known as chamber acid is used for acidulating. It is a dilute sulphuric acid of from 50° to 53° Bé, corresponding to a specific gravity of from 1.526 to 1.576 and containing about 65% of actual sulphuric acid, the balance being water. The reason for using this dilute acid is that, the resulting products, monocalcium phosphate and gypsum, both being hydrated products, require a certain amount of water for their formation. It also happens that chamber acid is the cheapest that can be used for the purpose.

CHEMICAL EQUATIONS.

To arrive at the proper amount of acid necessary for acidifying, chemical equations are resorted to showing in what proportion the acid and bases combine. Taking tri-calcium phosphate, the most important phosphate rock ingredient we have, for instance:



From the combining weights we see that 310 pounds of calcium phosphate require 196 pounds of monohydrated sulphuric acid, or every pound of tricalcium phosphate in the rock requires $196 \div 310$ that is .632 pounds of concentrated sulphuric acid.

But as the chamber acid is only about 65% pure there would be required $.632 \times 100 \div 65$ or .97 pounds of the dilute acid for each pound of calcium-phosphate. As the Ocean Island phosphate contains about 83% it would require 80.5 pounds of acid for each 100 pounds of rock to just combine with the phosphate alone. But in addition to this, calculations have to be made for the calcium carbonate, iron and aluminium phosphates, magnesium and every other ingredient which combines with sulphuric acid, for the acid does not show any particular preference for calcium phosphate and enough has to be added to satisfy them all.

ACIDULATOR.

After having computed the acid necessary, the materials are brought to the mixer or acidulator, as it is known. This is a large cast iron or lead-lined pan set upon rollers so that it may be revolved in one direction while a set of iron paddles or arms revolve within it in the opposite direction, similar to the action of an ice cream freezer. These pans are made in a variety of sizes and shapes, holding from one to five tons, depending upon the material used and the capacity of the plant. The idea, of course, with all makes is to produce a thorough and uniform mixing quickly. The acidulator is set over a vat or pit into which the mixture is dropped, leaving the pan ready for another charge. This operation is repeated until the pit contains the daily output of fifty or a hundred tons or whatever it may be.

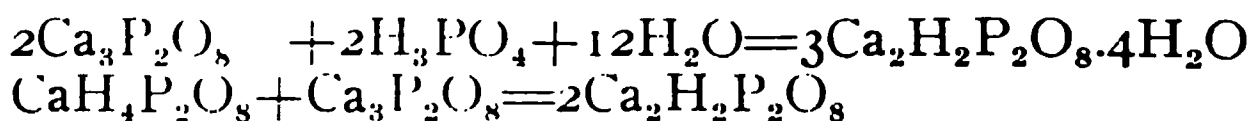
REACTION IN PIT.

As soon as the rock and acid come together in the mixer the reaction commences and after three or four minutes is dropped in the form of a thin mud into the pit where the reaction continues to completion. Carbon dioxide and hydrofluoric acid are given off together with the excess water which begins to come off as the temperature of reaction rises. The highest temperature reached is about 110° C. and seldom over 120° , if the proper acid has been added. Gradually the mass begins to solidify as it cools and in so doing catches the bubbles of gas that are on their way to the surface until finally there is a single cake of porous acid phosphate filling the pit. This acid phosphate is then dug out with pick and shovel when it has cooled enough and carried to the storage bins where it is allowed to stand for a month or more to become dry and to season.

REVERSION.

It is during this storage period that reversion takes place in improperly made acid phosphate or if there is a large amount of

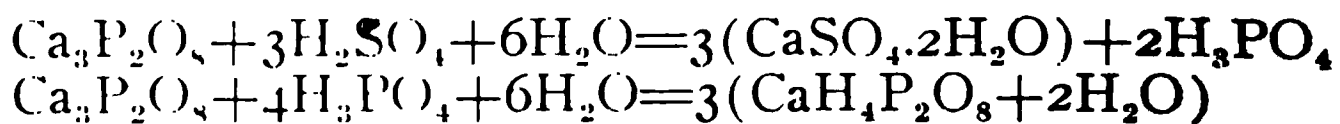
iron present in the rock. A series of secondary reactions set in whereby the free phosphoric acid combines with the unacidulated phosphate to form di-calcium or citrate soluble phosphate. If the reaction has been incomplete and a large amount of tri-calcium phosphate is left the acid phosphate unites with this, again forming reverted phosphate.



The tendency is to under-acidulate and to leave a small amount of the rock unattached, for by so doing one is assured that the acid will be used completely and no free acid will be left to damage the crop for which it is used. In these islands where water soluble phosphate is called for, reversion has to be guarded against much more carefully than in the states where water soluble and citrate soluble phosphates are considered of equal value.

A concentrated superphosphate or "double superphosphate" is made in Europe where low grade rock is plentiful and labor cheap. This material contains about 44% phosphoric anhydrid and is quite free from gypsum and other impurities. The method of manufacture is similar to that used in the production of ordinary superphosphate and is somewhat as follows:

The rock is first treated with sufficient dilute acid to form phosphoric acid and to precipitate the gypsum. The dilute phosphoric acid is filtered off into lead pans where it is concentrated to about 45° Bé. During the concentration of the acid the solution is constantly agitated to prevent the gypsum which has been held in solution from forming a scale on the bottom of the pans and the steam pipes allowing them to overheat and melt. This 45° Bé acid which contains about 45% of phosphoric acid is allowed to act on ground phosphate rock in the proper proportion to form mono-calcium phosphate.



As the reaction is not as energetic as with sulphuric acid and there is much more water to be evaporated the double-superphosphate usually has to be dried artificially and disintegrated before it is ready for use.

WOOD FINISHING.

A PAPER READ BEFORE THE AGRICULTURAL SEMINAR.

BY WILLIS, T. POPE,

Professor of Botany and Horticulture, College of Hawaii.

For some years I have been considerably interested in wood finishing, particularly that part which involves staining, filling and polishing. It is a great field of work, ever attractive and pleasing to investigate. New matter and different results are constantly presenting themselves. Though wood finishing is one of the very oldest arts, and one that requires much knowledge of materials, as a craft we find little literature regarding it.

Good instruction in iron work and wood work can be procured easily in almost any of our industrial and manual training schools, but, as a rule, very few lessons are given in the finishing processes that go to make an attractive piece of wood work, whether it be a piece of furniture or the interior of a dwelling. As a people, we depend almost entirely upon untrained workmen for our information. Good polishers very seldom know much about materials and their sources. They have little information to give away and the secret of their success, when found out, is about the same old receipt made good by hard rubbing.

In discussing briefly the subject of wood finishing, I will no

doubt dwell upon particulars of which you are more or less familiar, but I trust that the interest will be worth the short while taken.

No two species of trees produce wood of exactly the same structure. There is a great variation in woods of the same species, in fact a distinct study in each separate piece.

Examine almost any piece of wood, and in a general way we find it composed of small cells of various kinds, usually long and tubular, running lengthwise, and adhering to each other more or less strongly. These cells have had special uses in the life of the tree, some were for conducting crude sap from the roots to the crown, others acting as storehouses for digested plant food and still others have long acted merely for strengthening the tree and holding it together. Investigation shows that some of the cells have thick walls and small openings, others, thin walls and large openings. Most specimens of wood have these different kinds of cells arranged or grouped together in such a way as to form the *annular rings* which are so distinct on the cross section of most lumber and give the beautiful watered grain to longitudinal sections.

When the growth of the tree begins in the spring or at the beginning of the wet season in most tropical countries, there is a great demand for water in the crown where the multitudes of new leaves and twigs are forming, hence a new layer of large loose thin-walled cells is rapidly built; when the demand for crude sap is not so great, and when there is plenty of digested food to supply building material, the cells formed are narrow and thick walled; thus the latter growth of each season is heavier, stronger and darker in color than the earlier growth. As long as the tree is in good condition, distinct rings are left, one for each year, which the foresters and lumbermen make use of in determining the age of the trees of the forest. Fire or insects or anything of the kind damaging one side of the tree will often be the cause of incomplete annular rings. Seasons of drought leave narrow and indistinct rings that prove correct records of those dry years throughout the existence of the tree. These accurate records were very valuable to the parties who determined the great ages of the grand Sequoias of California.

Other markings, peculiar and interesting, and that have much to do with the finishing of some species of wood, are the dappels or thin plates of cells belonging to the *Medullary rays*. These lines of cells run from the pith in the center to the bark as longitudinal layers. Their function is to strengthen and bind the annual layers. Though they are present in most tree stems, they seldom appear more than faint lines radiating from the center of cross sections. In oak they are very conspicuous and add great value to it. To get oak boards well marked with these medullary rays, the logs are cut into quarters, each quarter being ripped up into boards with their cutting plane oblique to the quartering

cuts (or as near as possible along the lines of rays). This brings the surfaces of the boards nearer to the radiating medullary rays of the log, thus giving many of the dapples on each surface. This quarter cutting greatly increases the cost of the lumber because of the waste, but at the same time increases its strength and enhances its beauty. Trees of the forest that yield the most handsome lumber with a beautiful and well marked finish, are those which have plenty of room for growth, which are exposed to winds that cause them to bend and toss, and which have ample light and space for development.

The composition of wood is of importance to the wood finisher. It is briefly but well explained in "A Primer of Forestry," Bulletin

Specimen of Oak showing the dapples or *Medullary plates*.

No. 24 of the Division of Forestry, U. S. Department of Agriculture.

"Wood is made up chiefly of carbon, oxygen and hydrogen. When perfectly dry, about half its weight is carbon and half oxygen and hydrogen, in almost the same proportion as in water. It contains also about one part in one hundred by weight of earthy constituents, and nitrogen to the same amount. When burned, these materials disappear into the air, except the earthy constituents. The nitrogen and water taken up by the roots were originally in the air before they reached the ground, it is true therefore, that when wood is burned, those parts of it which come from the air go back into it in the form of gas, while those which come from the soil remain behind in the form of ashes."

The cell structure of most woods, as left by the smoothing tools of the workman, is so open that it is difficult to get a finished surface without using considerable expensive polish or varnish, which would have to be applied in thin coats with considerable time for each to become hard. This difficulty is overcome by the use of a *filler*, the name implies its object. A cheap, durable mixture is rubbed into the openings of the wood forming a body, or foundation upon which the finish is to be placed. Very hard, close grained woods, as olive, *lignum vitae* and some species of eucalyptus do not need the filler.

Wood filler for many kinds of woods may be purchased ready for use. Cheap varnish is sometimes used as a filler, and shellac

Monkey 10d shows the coarse structure that has to be filled to get a surface

cut with alcohol makes one of the best for work where the pores are not too large. Large cracks may be filled with a composition consisting of rosin and beeswax. Two applications of filler, if well applied, are usually satisfactory for any kind of finish. (The second coat should not be put on until about 36 or 48 hours after the first.) Too much of a single coat is apt to shrink away into the wood. Equal parts of *Japan drier* and *boiled linseed oil*, thoroughly mixed, with a body of *corn starch* to form a thick putty-like paste, thinned down to the desired liquid with turpentine, makes a filler that is suitable for most woods. Instead of corn starch, some earthy material as plaster of paris, whiting or pumice stone is sometimes used, but the old reliable corn starch has proven satisfactory.

Just a few words as to those materials that form the filler:

apan or Japan drier is a brownish liquid having somewhat the nature of varnish, called a drier on account of its property in paints, etc., is made by cooking gum shellac with linseed oil; the mixture is cooked down to a very thick fluid and then thinned with turpentine. Shellac is the shell form of *lac*, a resinous gum produced on several kinds of trees by a species of scale insect in the East Indies.

Boiled linseed oil, as most of us know, is a product of the flax seed obtained by placing the crushed seeds under great pressure, and the extracted oil then boiled with litharge (sugar of lead) which leaves a liquid varying from light amber to dark yellow in color, with the property of drying quickly when spread in a thin layer. The turpentine, of course, is the liquid obtained from the rosin of several species of pine tree.

Stain brings out the grain of the northwest.

Fillers are usually applied with a brush, sponge or piece of cloth. A few minutes after the application the work should be rubbed vigorously with another cloth, a piece of canvas, first crosswise and then lengthwise. It is not uncommon to add a little chrome yellow, yellow ochre, venetian red or burnt umber or some other color to the filler, which often improves the appearance of the wood. In finishing carriages, pianos and small articles, it is not uncommon for the workman to use polish, rubbing into the fresh application finely powdered pumice-stone, just a little at a time. The object of this is twofold, for leveling down and giving an even undersurface and to work a durable mineral material into the pores.

The *staining* of woods may be considered for several purposes:

First, to preserve the wood; second, to stain common woods to imitate superior classes, as the staining of common oak to give it the appearance of antique oak or as golden oak; third, staining to add uniformity of color throughout a piece of work. Wood of the finest quality, no matter how carefully selected, will be given some staining medium when it passes through the French polisher's hands, which he claims is done to bring out the beauty of the grain.

Staining has become very popular for house furnishings of late years on account of its cheapness and the fact that it does not destroy the natural beauty of the wood. It is less expensive to keep woodwork fresh and clean, when stained, than it would be to apply successive coats of paint and varnish.

Stain may be applied as an opaque coating on roofs and the exterior walls of houses, and again it may be applied as a thin wash, giving color to some depth, but leaving visible the character of the wood.

Some years ago, wood finishers used a great many vegetable dyes for coloring wood and when a dry pigment was applied water was usually the vehicle used to carry it into the wood, but turpentine, alcohol or an oil has been found to be better, as it does not raise the grain of the wood. If the liquid used as a vehicle to carry the color pigment into the work is a good wood preservative, the stain will have double value, i. e., to give color and to preserve. Boiled oil is highly recommended as such a liquid. A very good stain is composed of two parts of turpentine, one part of boiled linseed oil and a little Japan drier, these added to the color pigment that is selected, venetian red, burnt sienna, vandyke brown or crome green or some other color. In such a stain the oil gums the pigment, the turpentine keeps it thin until deposited in the proper place and then evaporates, and the drier helps to set the mixture.

I am told that many stains sold ready for use contain carbolinum, kerosene and various other oils that act as wood preservatives; denatured alcohol is also much used of late. Most of these are cheap and reliable. One gallon of liquid stain will cover about a hundred square feet, and after buying a few small sample bottles and finding a suitable one, you can usually rely upon getting a further supply to match. It is a good plan, and often saves much disappointment, if, before staining, a few small pieces of wood are experimented with till the required result is obtained.

"Aniline" dyes may be usefully employed on wood for self colors only—as distinct from various imitations of woods. Their introduction a few years ago, I am told, produced a disastrous effect on the old vegetable dye market, nevertheless many of the vegetable stains are exceedingly useful.

Logwood stain, made from boiling the chips of the logwood tree (*Haematoxylon*) is still a much used vegetable stain. This

product is imported from Central America and the West Indies. We have a few specimens of these trees about Honolulu. It does well in most warm regions of the earth.

Other dye-woods worthy of mention are red sanders, orchella wood, safflower and nut-galls.

Many coloring materials are to be obtained from common plants. The well known blueberry, when boiled down with a little alum and a solution of copperas, will develop an excellent blue color; treated in the same manner with a solution of nut-galls, it produces a dark brown tint; with alum verdigris and sal-ammoniac, various shades of purple and red can be obtained from it. A good green stain is obtained from broom corn.

Stain is usually applied with a brush, sponge or cloth, and on surfaced work, where the grain of the wood is to show, the excess is wiped off with a cloth in a few minutes after the application.

After a piece of wood has been stained, it can be given one or more coats of white shellac, smoothed with fine sandpaper and varnished. Varnish is a viscid liquid, consisting of a solution of resinous matter in oil or a volatile liquid laid on work to give it a smooth hard surface with a gloss.

Manufacturers claim that varnish should be used just as it is sold. While it is true that it is a mistake to add anything to the finer grade of varnish, the poorer qualities are often too thick to work freely without diluting. If it is necessary, add turpentine until the varnish spreads freely with a brush. After varnishing, let it stand for at least 24 hours, by which time the coat will be hard. A coat of varnish over one that is not hard will often result in *sweating* which will necessitate scraping the work and recommencing the job from the beginning. A good many have shellac for the first coat to fill the pores.

To apply varnish properly requires a good deal of practice and it is impossible to lay down rules that shall govern the process. The inexperienced almost invariably applies too much varnish and the result is it cracks. Where several coats are given, rub each down with fine sandpaper after it dries so as to give a smooth well filled surface for the next.

Spirit varnishes consist of alcohol and a vegetable gum as gum sandarach, gum copal, gum mastic, or a combination of mixed gums.

Alcohol and gum shellac also make a good spirit varnish. More quickly drying varnishes are said to be made of the gum cut with ether.

Linseed oil is the principal oil used in the manufacture of oil varnish. This varnish has a tendency to settle in a more even layer after spreading, although it takes longer to dry.

A wax polish proves quite satisfactory on many kinds of woods. The ingredients are beeswax and turpentine with more or less

rosin added to harden the surface, but many do not add the rosin at all. A good way to prepare the wax is to melt the beeswax and before it has time to cool, add the turpentine. Caution is necessary as both the wax and the turpentine are very volatile. As in the stain, the turpentine is merely the vehicle which enables the wax to be easily applied. In a thin condition, it may be laid on evenly over the work with a stiff brush or rag. After the wax has been spread the polish is obtained by friction and the more it is rubbed, the brighter it will be. This final rubbing should be done with a hard, dry piece of canvas.

For most good work, French polish is to be preferred to all other finishes, as finer results can be obtained by it. It differs from varnish in that the resinous material is applied with a rubber (a hard pad of cloth) instead of with a brush. To become a good polisher, skill and practice are necessary as well as knowledge of materials.

Polish requires that the pores of the wood be properly filled in order to get the smooth surface: fillers are used much the same as for varnish. After the fillers have thoroughly hardened, the laying on of the polish, which is called "bodying in," is begun. The way in which this is done greatly affects the appearance and durability of the gloss. When the body is too thin the gloss soon fades on account of the material sinking into the wood and when the body is too thick it gives the finish the appearance of varnish.

The rubber is made of long strips of cloth rolled tightly and bound with a string or rubber band; this is put into a double thickness of cloth, linen preferable, the ends of which are gathered up and tied. This form of a rubber is not very useful for mouldings, but a similar wad can be made more pointed for the purpose. Old rubbers, if well taken care of, are better than new ones. They should be kept in an air tight receptacle.

The process of applying the polish is somewhat as follows: The wad is moistened with the polish and then covered with a cloth which is brought over the end smoothly, then rubbed briskly across the grain to let the surface fill, after which the work is gone over with a series of circular movements, applying a moderate pressure, increasing a little as the rubber dries. In order that the rubber may pass smoothly over the work, a drop of raw linseed oil is occasionally added to the face of the rubber. As the rubber dries, more polish is added as in the first instance. A little polish will go a long way and at no time should there be anything like a flow from the rubber. The first *bodying in* should be continued until the wood will absorb no more, after which the rubber mark will still show but gradually disappear in the finish. The final operation in French polishing by which the gloss is put on to the body previously applied is known as *spiriting off* and it removes all kinds of marks. This process partakes very much of the nature of *bodying in*. It consists in washing the bodied surface with alcohol. The surface is gradually reduced to a fine gloss with all blemishes removed.

To make a good polish, take about six ounces of shellac and add one pint of wood alcohol; great exactness in proportions is not necessary. Shellac dissolves gradually and the process is hastened by shaking, but heat is not necessary. White polish is made with bleached shellac, common polish with orange shellac. Manufacturers of polish assert that in addition to shellac, certain gums improve the quality of the polish when properly used, but shellac is the principal ingredient in nearly all polishes. Gum benzoin and alcohol make a very good polish, but it is not generally used.

NEW FARMERS' BULLETINS.

Drainage of Irrigated Lands. By Charles F. Brown, Drainage Engineer, Office of Experiment Stations. Pp. 52, figs. 19. (Farmers' Bulletin 371.)

This bulletin gives details of experiments in draining irrigated lands in several localities in Utah, with costs, results, etc., and supplements Farmers' Bulletin 187, entitled Drainage of Farm Lands.

Soy Beans. By C. V. Piper, Agrostologist in Charge, and H. T. Nielson, Scientific Assistant, Forage Crop Investigations, Bureau of Plant Industry. Pp. 28, figs. 6. (Farmers' Bulletin 372.)

This bulletin has been prepared to supersede Farmers' Bulletin 58 on the same subject, and contains directions for the cultivation of the soy bean for hay, pasturage, ensilage, and in mixtures with other plants. Its possible value as a crop in the cotton belt and its use as a feed for sheep, dairy cows, and hogs are emphasized.

Experiment Station Work, LIII. (Compiled from the publications of the Agricultural Experiment Stations.) Pp. 32, figs. 5. (Farmers' Bulletin 374.)

Contents: Inoculation and lime for alfalfa; Citrus culture in southern Texas; Pruning rotundifolia grapes; Native hay of arid regions; Bermuda grass; Short vs. long feeding of beet cattle; Contagious abortion of cattle; Preventing losses at lambing time; Winter lambs for the Pacific coast market; Feeding work horses; Colony houses for poultry; Food of the crow blackbird; Flour for baking-powder biscuits.

PRESIDENT TAFT AND RECLAMATION.

(Telegram to the National Irrigation Congress, Spokane.)

"I greatly regret that I am not able to be present to hear the discussions and get the benefit of your deliberations. I have the deepest sympathy with the general objects of the National Irrigation Congress and you can count on my earnest endeavors to further the cause of reclamation by irrigation in every part of the country within the jurisdiction of the Federal Government."

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

ROUTINE REPORTS.

Division of Forestry.

Honolulu, Hawaii, November 3, 1909.

Board of Commissioners of
Agriculture and Forestry,
Honolulu.

Gentlemen:—I have the honor to submit the regular report of the Division of Forestry for the month of October, 1909.

ARBOR AND CONSERVATION DAY.

The main energies of the staff of the Division of Forestry during this month have been devoted to preparations for the free distribution of trees for planting on Arbor Day. On October 14 Governor Frear issued a proclamation designating Friday, November 12, as Arbor and Conservation Day and recommending that the occasion be observed by appropriate exercises in the schools and by tree planting. Following up the program to make this Arbor Day a record breaking event in local tree planting the Division has been busy calling the attention of the people to its offer of two dozen free trees to every land holder, and with the actual preparations of getting the trees ready to be given out.

Lists of names of persons desiring trees have been compiled by a number of the District Foresters and other correspondents of the Division. Notices that trees would be given away have been published in all the leading newspapers of the Territory, including the Hawaiian and Portuguese weeklies, and in some districts posters have been displayed telling where and how trees could be got. In this connection it is only fair to express appreciation to the newspaper men for the interest they have taken in this matter, in giving the Arbor Day notices ample and conspicuous space.

It is too soon yet to give figures of how many trees will be sent out, but the number of trees planted will go far ahead of all previous records. From the Government Nursery alone there will be sent out over twice as many trees as have ever been given out at any one time before. Besides this, trees are being given out from each of seven sub-nurseries, a feature that is new this year. These sub-stations are at Kalaheo, Kauai; Wailuku, Makawao and Lahaina, Maui; Hilo, Papaikou and Waimea, Hawaii. The Division of Forestry has done its full part in providing free trees and telling people where and how to get them. If any one fails to take advantage of the offer it is his own fault.

JAPANESE TREE PLANTING CONTEST.

Through the activity of the Rev. Frank Scudder, no small interest has been aroused among Japanese plantation laborers in the planting around camps and laborers' quarters. Prizes have been offered for the best work, the award to be made next year on the basis of results obtained at that time. As after care in tree planting is fully as important as the actual setting out of the trees this sort of contest is much to be encouraged for it is certainly a move in the right direction. There are few plantation camps but could well be made more attractive in general appearance. Whatever gives the laborer a greater interest in the locality tends to keep him there. For this reason I believe Mr. Scudder's plan is one that ought to receive encouragement from the plantation interests.

TREE PLANTING PRESS BULLETINS.

In connection with the Arbor Day distribution two new press bulletins of the Division of Forestry were issued in October. "Instruction for Planting Forest, Shade and Ornamental Trees, with Brief Notes on Propagation." This Press Bulletin is by Mr. David Haughs, Forest Nurseryman. It was printed both in English and Hawaiian. No. 5 is the English edition, 3,000 copies; No. 6, the Hawaiian, 2,000. Copies were sent out to persons receiving plants and also to the various schools, public and private, throughout the Territory.

EUCALYPTUS INVESTIGATION.

In continuation of the announcement made last month of a cooperative study of the planted Eucalyptus groves in Hawaii to be made jointly by the Division of Forestry and the United States Forest Service, I am glad to say that arrangements have now been completed whereby Mr. Louis Margolin, now on the staff of District Five of the Forest Service, with headquarters at San Francisco, has been detailed to this work. Mr. Margolin plans to leave for Hawaii by the December transport. Field work will be started at once on his arrival.

INSPECTION TRIP EXPERIMENTAL PLANTING

From October 26 to October 30 I was away from Honolulu on a quick inspection trip to Hawaii, to visit the upper slopes of Mauna Kea and take over the experimental planting enclosures that have been fenced under contract by Mr. A. W. Carter. Actual planting will be commenced in these plots in the near future.

On October 27 I was able to take advantage of unusual weather conditions to spend a whole day on the Kohala Mountain unimpeded by clouds. Mr. Carter has recently had a number of trails cut in connection with laying a pipe line. I went over these and also followed up the upper Hamakua Ditch trail to its head—a trip that I had not before made—so that the day was a very satisfactory one.

POULTRY ASSOCIATION MEETINGS.

The Hawaiian Poultry Association has begun preparations for its annual show to be held in the Armory January 12 to 15 inclusive, 1910. The President of the Association has requested that this Department coöperate as in previous years by an exhibit illustrating the work of its several divisions. In anticipation of the show, meetings of the Association were held in the Library Room of the Board Building, on October 20 and 29.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

Division of Entomology.

REPORT OF SUPERINTENDENT OF ENTOMOLOGY FOR SEPTEMBER.

Honolulu, Hawaii, October 1, 1909

Honorable Board of Commissioners
of Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen:—I beg to present herewith the routine report of the Division of Entomology for the month of September.

INSPECTION.

We boarded 30 vessels for the purpose of inspection and located matter for inspection on 17. The results of the inspection are shown in the following table:

<i>Disposal with Principal Causes.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	709	12,921
Refused landing.....	3	230
Fumigated.....	12	1,068
Burned.....	10	19
Total examined.....	734	14,238

Among the more important (because fraught with graver possibilities) pests intercepted may be mentioned: Fungus disease on bamboo and yam; saw-fly larvae on rose; two species of unknown ants from Australia; lepidopterous and dermested larvae on mango seeds from Manila; a large variety of pests in rice from Japan. All old rice coming here from Japan during the past two years was fumigated before shipment and was therefore uniformly free from pests. This month, however, one lot of 1,000 sacks arrived without apparently having undergone the preliminary treatment. As it was the first infested lot in a long while and the facilities for treatment were at hand, the shipment was treated here rather than returned as would have to be done in strict compliance with the regulations. The pests, too, were obnoxious because of their numbers rather than newness of kinds.

The "Aorangi" on the 15th brought seven cases of sugar cane from Mr. Muir, presumably stocked with beneficial insects. Immediately after landing they were hurried over to the Sugar Planters' Experiment Station's quarantine room, where Mr. Swezey took charge of them. No further action was taken on our part, since Mr. Swezey was aware of the precaution necessary to prevent the escape of any pest, and perfectly competent to do so.

The same boat also brought a small wardian case of a variety of plants in soil from an unascertainable point in Australia. For fear the soil or plants might be pest laden, vigorous inquiry for the consignee was instituted, but to no avail. With the kind consent of the customs collector the case was placed in quarantine, and later burned.

LOCAL PROBLEMS.

The Japanese beetle is apparently in full sway now judging by the number of requests for inoculated beetles. These requests are being satisfied as fast as possible. Arrangements are in progress with the honorary plant pathologist to prepare a number of pure cultures of the fungus in tubes which will be available for distribution at short notice.

The manager of a stock ranch on Hawaii has made repeated calls for assistance in the work of subduing the troublesome thimble berry. Like lantana it is fast overrunning valuable land by aid of the minah bird which eats the berry and scatters the seed. It imposes a great burden on the ranch to keep the pest within bounds. In the absence of accurate knowledge of conditions in the field no expert advice could be offered, nor could time be spared from inspection duties here to pay the necessary visit. Probably in the presence of the new superintendent such a visit will be made possible in the near future.

The melon fly problem is still pressing hard for solution. Our

estimated loss from the ravages of this pest is about three-quarters of a million dollars annually, made on a conservative basis. An expense of \$5,000 dollars per annum to cover the salary and traveling expenses of an expert for from one to three years would doubtless bring relief. The saving thus effected would be more than the mere prevention of further loss. The ability to raise cucumbers, melons, squash, etc., would be an added inducement for immigrants to remain on our soil. The success or failure of our attempts at colonization or domiciling labor may depend upon whether or not these people can add to their income by growing the fruits and vegetables now made impossible by this pernicious pest.

The avocado mealy bug is another pest that cannot be suppressed too soon. It is not only a serious annoyance to the horticulturist by damaging and marring many ornamental plants, but is a formidable hindrance in the cultivation of avocado, figs, guava, etc. It is supposed that Central America or the West Indies is its native home where also an effective enemy may be found. The suggestion has been made to ask Mr. Koebele, after completing his horn fly work in Europe, to visit those regions on his way home and investigate the chances for relief from that quarter. If such an arrangement can be made it would be highly desirable. The community is clamoring for and is entitled to relief from this noxious pest.

The Smyrna fig wasp (*Blastophaga grossorum*) seems to be firmly established at Moanalua. When out there with Mr. Ehrhorn on the 27th we observed not only an increased number of capris (*Mammone*?) adhering to the trees as a result of effective entrance by the wasp, but many smyrnas were also found invaded by the insects, producing the first perfect Smyrna figs on the islands. The fig industry can and should be made to pay in the Territory. Land and climate are favorable, cultivation, drying, packing and shipping comparatively simple and easy. No great initial outlay is needed, and three or four years should produce the first paying crop. We have in this industry, in addition the coöperation and help of the Federal authorities, who propagate and distribute gratis many choice varieties of capri and smyrna plants. Whatever agency is necessary should be set in motion to give this promising industry a healthy stimulus toward progress.

On the 2nd we were honored by a brief visit from the Governor, Congressmen Scott and Taylor, and two other gentlemen. The hour was rather late, nearly 6 p. m., but the opportunity was taken to give the Territory's guests a fair insight into the work and accomplishments of the Division of Entomology since its inception.

On the 24th Mr. Edward M. Ehrhorn, the new Superintendent of Entomology, arrived. As his duties do not begin until

October 1st, I remained in charge until then. After two years' work at the waterfront at the work of inspection many friends in all ranks of society were made whose aid in the work was indispensable. This opportunity is grasped to express sincere thanks for their coöperation, which was both an official and personal favor. The office force likewise deserves high commendation for sustained support and encouragement.

My new chief I hail with pleasure, being ready and willing to render him all courtesy and support. All my acquired knowledge of local conditions is at his disposal. I turn over to him the reins of the Division, an organized and systematized service that took much time, effort and labor to effect. May he succeed and prosper.

Very respectfully,

JACOB KOTINSKY,
Superintendent of Entomology.

Honolulu, Hawaii, November 1, 1909.

Honorable Board of Commissioners
of Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of October:

Of 27 vessels boarded we found fruit, plants and vegetables on 16. These shipments received the usual rigid inspection and were disposed of in the following manner:

<i>Disposal with Principal Causes.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	682	17,235
Fumigated before releasing.....	14	40
Burned.....	14	36
Total examined.....	710	17,311

Possible pests intercepted:

Aracocerous sp. in seeds from Sydney.

Bruchus chinensis in peas from Japan.

Ants on plants from China, Japan and California. (Close inspection is being made for the Argentine ant on all shipments from California.)

Aspidiotus cyanophilli Sign. on palms from U. S. A.

Odonaspis secreta on bamboo from Japan.

Aspidiotus rapax and *Fusicladium dentriticum* on pears from California.

Mites and beetle larvae on yams from Hong Kong.

Two shipments of Queen bees arrived, one by mail and one by Wells Fargo & Co.'s Express. The latter consisted of two brood sections, one of which contained only dead bees and was the result of too little food during shipment, the other was in good condition and after removing the Queen both sections with all the bees and boxing were burned. The mail shipment was treated in the same manner.

A box of pine trees as Japanese baggage was confiscated, fumigated and after a careful examination was found infested with Lepidopterous larvae infesting the cones and twigs; the shipment was burned.

One lot of pears was destroyed on account of being badly infested with the pear scab *Fusicladium dendriticum*. As this disease is very liable to attack other plants such as Loquat, etc., it is best to dispose of such material although the chances of infestation are but slight under such conditions.

A small box containing three young hornfrogs was confiscated and the frogs killed.

The following report on inspection at Hilo was received from Bro. M. Newell:

"Five foreign vessels entered Hilo Bay. There were 109 lots and 1,619 parcels.

"Three cases of lemons were fumigated on account of purple scale.

"A small amount of fruit having arrived in bad condition was thrown into the water.

"Everything else being found in good condition was passed.

"An injurious weevil that does damage to ferns in Honolulu has been introduced into Hilo, where it was not known until recently, having been brought here in ferns from that city."

A sample of Hevea leaves was brought to the office by Mr. John Palmer from Nahiku showing some blight which riddled the foliage. The general appearance looked like samples of wind-beaten foliage, but I recognized some spores similar to the Shothole fungus of the apricot. I submitted these samples to Mr. Lyon, the vegetable pathologist of the H. S. P. A., who diagnosed the trouble as *Phyllosticta* sp.; the shothole fungus of the apricot belongs to the same genus. It will be necessary to carry on field experiments so as to determine what remedy would be best to use for checking this disease. Very successful work has been done with Bordeaux wash on the apricot fungus.

The last shipment of hornfly enemies received from Mr. Koebele consisted of true parasites, an Alysids species. Mr. Swezey reports that many have issued from the puparia sent and he is now propagating these on home collected larvae and pupae. It is too early to say just what to expect from this new importation; the parasites were breeding in the jars and if the Alysids

take hold we have reason to believe that better results may be had from them than from the Hydrophilid beetles.

Truly yours,

EDW. M. EHRHORN,
Superintendent of Entomology.

Division of Animal Industry.

Honolulu, Hawaii, October 20, 1909.

Honorable Marston Campbell,
President and Executive Officer,
Board of Agriculture and Forestry,
Honolulu, Hawaii.

Sir:—I beg to submit for the consideration of the Board Rule 9 of the Division of Animal Industry, entitled "Rule 9.—To Amend Rule 8 of the Division of Animal Industry Governing the Quarantine of Horse Stock (Horses, Mules, and Asses) Arriving from or Through the State of California."

This Rule has been considered by the Committee on Animal Industry, the report of which is enclosed.

Animal Quarantine Station. The new Animal Quarantine Station on the Beach Road was taken in practical use on September 25th when the S. S. "Lurline" arrived with a large consignment of live stock, which a week later, was supplemented by another consignment arriving by the "Hilonian." At one time we have accommodated about 70 mules, 15 rams, and a number of horses which were divided in eight different inclosures. The arrangement and facilities for handling this large number of animals and the segregation of diseased and suspicious animals have proven entirely satisfactory.

In regard to a quarantine station or to an extension of the quarantine station in Hilo I append a letter from Dr. H. B. Elliot, dated October 11th, and which is self explanatory.

Tuberculosis. Applications for tuberculin as supplied by the Federal Bureau of Animal Industry are received from time to time, but as stated in my last report, certain conditions are required to be complied with by the federal authorities before such applications are granted.

As the tuberculosis question is one of the most important ones in the live stock industry in this Territory and as the assistance of the Federal government in supplying tuberculin free of charge is valuable, I have thought it well to formulate certain rules to

be adhered to by this Board in dealing with this question and I submit the same for your consideration.

1. Tuberculin supplied free of charge by the Bureau of Animal Industry will only be furnished to veterinarians in the employ of the territorial or county governments or to veterinarians working under the direct supervision of territorial or county veterinarians.

2. No animal or herd will be tested by officers of this Board and with federal tuberculin unless the owner first agrees to segregate or dispose of all reacting animals in such a way that their milk is forever precluded from being used for human consumption, nor to be fed to calves or pigs or used for the manufacture of butter, cheese or other dairy products without having previously been pasteurized; all reacting male animals to be excluded from breeding purposes; all reacting animals to be plainly branded on both sides with the registered brand of this Board which consist of a TV connected at the top, the same to be first advertised and announced to indicate that an animal which bears the said brand has been officially tested and found to be suffering from tuberculosis.

The disposition of reacting animals is a problem which has made the eradication of tuberculosis among cattle very difficult wherever it has been attempted. Various methods have been employed among which the most successful has been the so-called "Bang" method which is used principally in the old country and in some of the eastern states as New York and Pennsylvania. This method consists in the absolute segregation of reacting from non-reacting animals on the premises of the owner, but requires separate barns, yards, milk houses and utensils and, on large estates, of separate attendants. This method, however, is principally resorted to where the question is to preserve a highly developed strain of blood or valuable breeding animals. The principal feature of the method consists in the removal of all calves from the reacting division immediately after birth and a systematic testing of all non-reacting animals, at least once a year. The method is expensive only as far as its installation is concerned, but does away with the destruction of all reacting animals except those suffering from tuberculosis in an advanced state.

The next method consists in the destruction of all reacting animals, the same being sent to slaughter houses where Federal meat inspection is maintained, and the carcasses disposed of according to the judgment of the meat inspector as to whether fit for human consumption or not. This method is principally employed in those states of the Union which pay a compensation to the owner in proportion to the loss suffered by him.

Either of the methods might be employed here or a cooperative breeding farm for reacting animals might be established with sup-

port from the Territory and under territorial supervision, as fully described in previous reports.

I have gone into this subject in detail as it appears that for the present time at least the city and county government of Oahu has dropped the subject of regulating the dairy industry at least so far as requiring the tuberculin test for cows furnishing commercial milk, and as a number of dairymen and cattle owners are anxious to rid their herds of tuberculosis, I thought it well for the Board to be prepared to render assistance along these lines when so requested.

Hog Cholera. I append herewith further correspondence with the inspector in charge in San Francisco, Dr. Geo. S. Baker, pertaining to the prevention of exportation from San Francisco to this place of hogs suffering from cholera.

Importation of Live Stock. The following live stock has arrived in this port since my last report:

September 24th, S. S. Alameda:

- 1 dog,
- 1 cat,
- 1 parrot.

September 25th, S. S. Lurline:

- 47 mules,
- 4 horses,
- 10 bulls,
- 2 crates of chickens.

September 29th, S. S. Columbian:

- 150 hogs.

October 2nd, S. S. Hilonian:

- 20 mules.
- 15 sheep,
- 1 dog,
- 6 crates of chickens.

October 7th, S. S. Enterprise:

- 29 bulls,
- 24 mules,
- 16 crates of poultry (Hilo).

October 15th, S. S. Alameda:

- 1 dog,
- 12 crates of turkeys,
- 1 crate pigeons,
- 1 crate chickens.

October 19th, S. S. Nebraskan:

- 1 dog.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

Honolulu, November 2, 1909.

Honorable Marston Campbell,
President and Executive Officer,
Board of Agriculture and Forestry,
Honolulu, Hawaii.

Sir:—I beg to report on the work of the Division of Animal Industry since my previous report, dated October 20th.

At the request of Mr. George Cooke, manager of the Molokai Ranch, I accompanied him on October 26th to Kaunakakai, having previously obtained your permission to do so. An outbreak of actinomycosis or "lumpy jaw" had occurred among the recent importation of Devon bulls and the management of the said ranch were anxious to prevent its further spread.

An examination of the animals in question showed that four out of the ten imported bulls had become infected with actinomycosis. Two had been operated on and all had been submitted to the iodide of potash treatment with good effect. Additional treatment in the form of arsenic acid to be inserted into the tumefactions was suggested and the requisite precautions taken to prevent the further spread of the disease by the application of crude oil to all fence posts and other wood work in the paddock where the animals were kept isolated.

I am pleased to report that the management of the Molokai Ranch have gone in extensively for agriculture with the principal view to produce feed stuffs in the form of alfalfa and corn, and that the alfalfa especially is doing exceedingly well. Cotton and potatoes are also being experimented with, as well as vetches and cassava. More than 500 hogs are being prepared for market by feeding them with alfalfa and rice bran.

I returned to Honolulu on the morning of October 31st and shall, according to your instruction, leave for Maui on November 2nd for the purpose of making a tour of inspection of this island.

Glanders. On October 20th two animals were tested at the Quarantine Station. Of these animals one was a mule which had recently been imported. At the time of landing the mule showed a suspicious discharge from the nose and was separated from the rest of the herd and kept in a stall in the glanders part of the Quarantine Station. At the end of the period of quarantine, as the discharge still continued, the animal was submitted to the mallein test with a negative result. The other animal tested was a horse belonging to the Union-Pacific Transfer Company which was regarded by our inspector as suspicious and consequently was tested. It gave no reaction and was returned to the owner.

On October 26th Dr. Rowat telephoned that Mr. Ross of the Honolulu Plantation, wished the Territorial Veterinarian to come

down to inspect a horse at Waimalu gulch, which had some discharge from the nose. It being necessary for me to leave Honolulu for Molokai that afternoon the Assistant Territorial Veterinarian was sent down and inspected the animal in question, finding it affected with glanders. The animal was taken to a suitable place and killed and Mr. Ross agreed to have it buried and the place properly disinfected.

On October 28th our inspector brought three suspects to the Quarantine Station for testing; one from Moiliili belonging to one Yamada, one from Manoa Valley belonging to one See Hop, and one from Kalihi belonging to one Tanabe. These animals were submitted to the mallein test on the following day with the result that the one from Moiliili gave typical reaction and consequently was condemned. This animal also showed clinical symptoms, having a profuse discharge from the left nostril and greatly enlarged submaxillary glands on that side. The remaining animals showed no reaction and were discharged.

On November 1st a post mortem examination of the condemned animal was made, and the results fully demonstrated the accuracy of the mallein test.

Importations of Live Stock. Importations of live stock at Honolulu since the last meeting of the Board are as follows:

October 28th, S. S. Hilonian—4 mules for the Quartermasters' Department, which were quarantined at Iwilei; 3 dogs; 50 head of Tunis sheep for the Molokai Ranch, and also a number of crates of chickens and turkeys.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

NATIONAL IRRIGATION CONGRESS.

Note: By an inadvertence an article upon the National Irrigation Congress did not appear last month. The following abridged account is inserted here as matter of record.

The Seventeenth National Irrigation Congress was held at Spokane, Washington, from August 9th to 14th last, over one thousand delegates being present. The Territory of Hawaii was represented by Messrs. Ralph S. Hosmer, W. H. Babbitt, Augustus Knudsen, J. T. Taylor, E. Lord and L. G. Blackman.

The delegation from this Territory attended the Congress with the definite aim of endeavoring to procure the adoption of a resolution recommending the extension of the Federal Reclamation Act to Hawaii. By concentrating all effort to this end, sufficient sympathy was created with the endeavor of Hawaii to fulfill its part in the national welfare, to obtain the object desired.

On Tuesday, the second day of the Congress, the resolution of the Hawaiian delegation, which was adopted later in the week, was introduced. It is here given in full:

Whereas, The rapidly growing commercial and naval interests of the United States upon the Pacific coast emphasize the strategic value of the Hawaiian Islands to the nation; and

Whereas, To enable the Territory of Hawaii to respond to the duties placed upon it, there is required on the islands a large, vigorous, self-reliant American community; and

Whereas, The Territory of Hawaii in what has already been done, including the recent levying of a special income tax to assist immigration and encourage the conservation of natural resources, has approached the limit of its own ability in an effort to develop the country along traditional American lines; and

Whereas, It appears that one of the most practicable ways to secure the necessary increase of actual American homes in the Territory is through the extension to Hawaii of the Federal Reclamation Act; therefore, be it

Resolved, That the National Irrigation Congress urges the Congress of the United States to extend the reclamation act of June 17, 1902, to the Territory of Hawaii.

Mr. Pinchot, chairman of the National Conservation Commission, delivered his widely reported speech on this day. He dwelt largely upon the importance of resisting the large corporate interests in their endeavor to exploit the national water power sites to the detriment of the common good.

The chief interests to the Territory of Hawaii centered around Forester Hosmer's address, in which he demonstrated the national importance of extending the operation of the irrigation laws to this Territory. He showed how much out of proportion to its size must be the role played by Hawaii in the development of the whole nation and how much the Territory had already accomplished for the safeguarding of the western coastline against the introduction of disease and agricultural pests. Upon this small community is placed a national trust which it has fulfilled with integrity and efficiency, but in order that it may carry out to the full its beneficial part in national affairs, it is absolutely imperative that assistance be forthcoming from the Federal Government to help place upon our lands a body of substantial citizen homesteaders actuated by ideals and motives similar to those possessed by the nation at large and thoroughly in sympathy with the policy of the Federal Government. In order to procure desirable citizens the extension of the national system of reclamation of arid land by irrigation was of prime importance, for it would enable the Territorial government to offer homestead sites upon sufficiently advantageous terms to attract mainland settlers.

Mr. Hosmer's address met with very general favor and much applause.

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RUBBER CONVENTION.

The third annual session of the Hawaiian Rubber Growers' Association was held on Thursday, December 16th; both morning and afternoon meetings bringing forth a large attendance. The following program was announced by Mr. Fred L. Waldron, president of the Association:

- "Hevea or Ceara in Hawaii," Mr. C. J. Austin.
- "Inter Crops," Mr. L. F. Turner.
- "The Rubber Situation in Hawaii," Mr. W. A. Anderson.
- "Rubber and the Small Farmer," Doctor E. V. Wilcox.
- "Rubber and Reforestation," Mr. R. S. Hosmer.
- "Tapping," Mr. F. T. P. Waterhouse.
- "Marketing Rubber," Mr. F. L. Waldron.
- "Rubber Enemies," Mr. E. M. Ehrhorn.

There are in the islands five incorporated companies whose principal business is the growing of rubber. Statistics were read from all these and also from two individual planters. The whole Territory was represented with the exception of Oahu and Kauai. Six reports were received from Maui and one from Hawaii. The area controlled by rubber companies and by individuals in the islands is 5599 acres. Of these there are planted to date 1338 acres, namely, 242 acres in Hevea, 1092 in Ceara and 4 acres in other varieties. The total number of rubber trees planted is 430,140, of which 79,940 are Hevea, 349,400 in Ceara and 800 of other varieties.

Four plantations practice clean cultivation, the managers of two of these considering it absolutely necessary. From reports received there are 11,000 rubber trees that may possibly be tapped commercially during the year 1910. Fertilizers are considered too expensive to use in sufficient quantities at present to be remunerative.

The first speaker, Mr. C. J. Austin, dwelt at length upon the relative merits of Hevea and Ceara as an Hawaiian rubber crop. Although Ceara is a somewhat quicker producer than the former,

the speaker gave his preference in favor of Hevea, which is now doing exceedingly well on the island plantations. The average time, after planting, for tapping Hawaiian trees was stated as not exceeding six years.

Mr. L. F. Turner read an interesting paper upon inter rubber crops and brought forward much invaluable information. Such catch crops as corn, cucumbers and melons were recommended to be grown between the young trees, as by this means expenses during the initial stages of the plantation can be greatly reduced. Care should be taken to grow crops which do not make too great demands upon the soil. A method which has been tried with success is to let out certain portions of the plantations to Japanese cultivators, who attend to the young rubber trees in return for the use of the intervening spaces for growing other crops.

Doctor Wilcox, director of the local Federal Experiment Station, delivered an instructive address upon the cultivation of rubber, chiefly with reference to the question whether a man with a small area of cultivated land was likely to be able to derive an income from rubber trees, and also his opportunities for disposal of the latex.

One of the first difficulties that meets the man in connection with rubber is where the best locations for rubber-tree growing are to be found; that is, for planting small areas. The first question that arises is what crop he may grow and receive sufficient for to make a profit while waiting for his trees to mature. Doctor Wilcox felt that a man with a small holding of a few acres must be close to a larger plantation which is provided with all the machinery for working up the latex.

There are many small locations which a larger plantation does not care to use, where a man could have from five hundred to a thousand trees or perhaps more. The speaker said it would be a wild scheme to suggest to a man with four or five acres that rubber could be made a source of income therefrom. If a man with a small area developed other products from which he could make a living, then he saw opportunities to enlarge. He believed, however, that the operation of a small rubber plantation not so situated with regard to a larger one that it could dispose of its latex, would not meet with any great success.

Doctor Wilcox was also very certain that when the growers began to tap the trees on a large scale it would be necessary to set a standard of grade. It is obvious that the market wants certain kinds of rubber more than others. If the Rubber Growers' Association wants a rubber standard in Hawaii it will be necessary to adhere strictly to that standard. The easiest way to destroy confidence in the standard of rubber is to fail to maintain it.

To make the rubber business a success it is necessary to grow other crops as well. Of course, the difficulties confronting the small farmer in Hawaii were greater than those which confront a mainland farmer, owing to the transportation cost, and other disadvantages.

Taking bananas as an instance, Doctor Wilcox said there have been dozens of shipments from Honolulu to the mainland which have arrived in San Francisco in good condition but the receipts have been so small that the freight could not be paid. A man on Maui can not therefore raise bananas and other like products and expect to market them in San Francisco.

The pineapple situation is somewhat similar, especially as to shipping fresh fruit. Tremendous loss is sometimes sustained from rot, and the enormous cost of shipping in cold storage, to prevent that rot, is almost prohibitive. He instanced shipments from one pineapple plantation which has practically lost \$4500 on its crop, the receipts not having even paid for the freights.

Under these conditions there are left only a very few crops which can be safely grown by the small grower with the idea that there is to be a certain market for the product. The speaker had no hesitation in saying that rubber can be grown that will give a reasonable price, provided it is brought to the market in a standard form.

He spoke of his recent visit to the mainland and the fact that in many instances where he registered at a hotel, rubber men came to him and asked if rubber was being produced in Hawaii. They wanted to know how much they could get here. He believed that cotton could be grown as a by-product with rubber, but did not recommend tobacco, as the latter depleted the soil too much and would therefore have a bad effect on the rubber trees.

Mr. F. T. P. Waterhouse now gave an instructive address on the methods of tapping rubber trees as practiced in the Straits Settlements, from which he has recently returned. Mr. Waterhouse reported that a great advance had been made in this department of production, since his visit to the rubber plantations there a year ago. Whereas on the former occasion many different methods were in operation and various tools were in use, now a general standard of procedure was observed. The coolies, who are employed for tapping, have become more expert and better results are obtained. Owing to the increasing demand for rubber the trees are tapped at an earlier age. Disc harrows are being used in Java to cultivate between the rows of trees, and much benefit is derived from this operation.

Speaking on the pests of rubber trees, Mr. E. M. Ehrhorn, superintendent of entomology, cited the shot-hole fungus and the blight which disfigures the banyan trees. For these enemies he recommended an application of bordeaux wash before the trees had attained too great a height.

The addresses delivered by Messrs. Anderson, Hosmer, Waliron, Turner and Lindsay are presented at length in this number.

OBSERVATIONS ON HORTICULTURE IN HAWAII.

By EDW. M. EHRHORN.

An address delivered before the Social Science Association of Honolulu, on Dec. 6, 1909.

Coming from California where horticulture is at about the highest point of perfection, where nearly every kind of fruit, flower and tree has been tried, where the soils vary to such an extent that at times a hundred acre field is not unlike a checker-board, I have taken some interest in and have made some general observations into the methods of your horticulture since my arrival a few months ago. Your wonderful growth, your perfect climate and apparently rich soil have made it possible to call this the Paradise of the Pacific. Climate and soil go a long way to produce the magnificent growth which is to be found, but soon there is climate alone left and other agents must come to the front to assist in keeping up the growth and beauty of the surroundings, and I will endeavor to bring out some points on these lines in this paper tonight.

In California we started in a happy go lucky way with our fields of grain, our vineyards, orchards and gardens and tickling the soil and laughing at the harvest was the real thing for a time at least. We were able to raise enormous crops without much effort. This, however, did not last very long and rotation, fertilization, cultivation and irrigation of crops has to be taken up, not haphazardly either, but on very scientific lines. This all may seem strange to some and you may ask why all this was necessary and the answer is, that the available foodstuff in the soils gave out. The grains, vines and trees took up tons and tons of elements from the soil, gave tons and tons of produce, but the grower never thought of giving the soil anything to replenish the enormous drain, and the yield got less and less, the luxuriant growth became smaller, the crops inferior, and then came innumerable inquiries into the cause. Scientific investigations were started and finally after drawn out experiments, successful results were obtained.

You have gone through somewhat like phases here in the cane fields and other plantations and I cannot add anything to the work done there, but I must dwell more on the smaller holdings around your homes, your plants and your first trees. I have been told that a few years ago your orange trees yielded an abundance of fruit and your other trees did better than today and I find in looking over the ground, that there is a great lack of horticultural methods, such as pruning, cultivation and the like. I have seen trees which are almost gone and the idea that insects alone are the cause of this, must be dispelled, in most cases it is the lack of pruning, cultivation, fertilization and irrigation, which is at the bottom of it all. You see large orange trees almost leafless,

trees which once showed great vigor. Many of your old mango and alligator pear trees are not the trees of a few years ago; it is true that the Avocado does suffer severely from the attack of scale insects, but this is not the entire cause of the lack of vigor, the trees must be fed. Another phase of failure is attributable to too close planting, especially is this true where extra planting has been done after certain trees have grown to good size. These trees had spread their roots in all directions and when the young tree was set out and cared for, and the care given in the first few years is always better, the large tree got more benefit, being directly in line to get the extra care of the little one, through its ever ready root system so well established. Very often the shade of the larger trees prevents replants from becoming strong and vigorous trees. The growth of these is always more or less long and feeble and at times very brittle, the foliage although scanty is generally large, but flowers and fruit are beyond the efforts of the tree.

In talking with some of your older settlers I am given to understand that pruning, except perhaps a little thinning, and there is a vast difference between pruning and trimming, is almost unknown here. There is perhaps no more interesting and fascinating phase of horticultural work than pruning trees and plants. We cannot remove a single part of a tree or plant without the remaining parts being affected by it. A tree is capable of being shaped and balanced by pruning and he who prunes will get results, very good results if pruning is correctly done, if wrongly done we can at times expect serious loss. Pruning cannot be learned from books, but must be learned by studying the habits and growth of plants. It is comparatively easy for a skillful horticulturist to prune a tree or even a rosebush, so as to secure the desired results. It is a very difficult matter for him to tell others how to prune, and in pruning it is more difficult to formulate fixed principles than in any other branch of agriculture. What makes pruning a difficult task is in the fact that no two trees for example are just alike and this places pruning in the category of intelligent pursuits rather than in a matter of fact rule of thumb motion.

At certain periods of the tree's life pruning tends to invigorate the plant; more pruning then, on judicious lines, will do much to help improve the looks of things generally speaking. We know from practical experience for instance that the fig tree will bear better and the fig wasp will do better work, when the fig tree is pruned in such a manner so as to cover its branches thickly with foliage. We often see fig trees with long bare branches, with a cluster of leaves at the end and we may get a few figs at the ends of the limbs. By correct pruning we can produce figs all over the tree; we have produced a large bearing surface.

In pruning roses under certain methods we are able to produce abundant blooms and good specimens, whereas by no pruning or

wrong pruning we get a lot of small blooms or none, often nothing but long lanky growth. Too much wood left is as bad as too little and to regulate this much will depend on the vigor of the plant.

In pruning shade trees or shrubbery it is easier to say 'dont' than 'do', yet many flowering shrubs can be greatly improved by pruning, not only in giving good shape, but also in producing more bloom. There is nothing more disappointing to a lover of plants than to see the results of a so-called tree-butcher after he has completed *trimming* the tree or shrub.

Shrubs should be given as natural a shape as possible and yet this can be done without cutting the whole bush to pieces or shearing off the top to a level. Such methods not only destroy the natural beauty of outline, but lessen the ability of the plant to produce flowers and also weaken it. Therefore to become an intelligent pruner one should know a little of plant physiology. One should know what effects pruning will produce at different seasons of the year. One important point in all pruning is to be sure to make clean cuts and under no circumstances leave short stumps protruding from the main trunk or limbs. This is a very general practice here and it not only makes an ugly unsightly object, but prevents the plant from healing over the wounds, which become favorable places for all kinds of insect pests.

In conjunction with pruning we use the pinching back and suckering methods. These are intermediate phases of pruning, and used at the proper period, will save much vigor to the plant.

Next in importance to pruning is feeding the plants. As stated above it is generally the practice of the grower to get all he can from the plant, but not to give to the plant. In the home yard and especially where everything is covered with lawn, it is impossible to cultivate the soil by turning it over. This is a great drawback, as much moisture is wasted and the renewing of the top of the soil is prevented. The roots of the various trees and shrubs are underlying the grass sod and the moisture, which would remain in a tilled soil is taken up and rapidly at that, by the roots of the lawn. Water does much towards the liberation of the soil elements and unless sufficient water can reach the lower level where deposits of various plant foods are, trees and plants are going to suffer from lack of food. Feeding trees then under these conditions is about the only thing to do.

The soils on the plains and lower elevations of this island contain many elements, but the quantity of the three principal elements, viz: nitrogen, potash and phosphoric acid, is very small in comparison to others not so important in the feeding of plants. Nitrogen, the element so necessary for the vigorous growth of trees and plants, would soon be consumed and must be replenished to keep up the magnificent beginning. Potash, which is generally admitted necessary to produce quality, is also an important element and phosphoric acid which strengthens the embryo fruit and thus enables the tree to hold the crop, must be added to the other

two if good results are expected to follow. Lime, which is also not very abundant in many places, can be used to good advantage and will greatly help to promote the dissolution of the elements for the use of the plant.

Experience alone can tell when and how to apply these foods and some means must be found to place the food below the feeding area of the lawns, so that the bulk will be taken up by the trees or plants.

In many places close planting is causing many weaker trees to go backwards and many are almost beyond help, the larger trees having taken the bulk of the food from them.

Another important matter on which I desire to say a few words and which I am pleased to say has already found a good start here, is the improvement of fruits by selection. I am given to understand and I believe it is true that most of your fruits, except a few late introductions, are seedlings, your alligator pears, mangoes, papaias and others and as such there is an enormous variation, an unlimited mass of types. Among these we find some very choice fruits, some early, some late, some heavy producers and some barren trees. We find some trees of dwarf habits, some giants of the most vigorous type, and from all this material it would be a very easy matter to select such that would enable you to have good fruit all the year round. Why should any one support a barren tree or one which produces inferior fruit, when the ground upon which it stands will support one which will yield an abundance of luscious fruit?

I know a grower in California who improved a vineyard in which about 25 per cent. of the vines were barren and in which another 25 per cent. were yielding small inferior grapes. Two years of selecting, the first year marking the vines with white paint, the second year remarking those vines which retained the desired type of grape with red paint and only taking cuttings from these, enabled the owner to plant a vineyard of what we would call pedigreed stock and when it came into bearing, every vine produced and every bunch of grapes looked alike and commanded the highest value in the New York market.

Such inspiration for better products and for higher horticultural work can be traced indirectly to Burbank's work. This work not only occurs in California, but all over the United States and in nearly every country now students of the Burbank school are cropping up every day. Our great Department of Agriculture at Washington is thoroughly equipped along the plant-breeding work and is accomplishing good work. Nearly every Experiment Station and Agricultural College is teaching plant-breeding. Many individuals, in fact the number now is beyond counting, have taken up the work and it is a common thing to hear of Mrs. D's new rose or Mr. K's new chrysanthemum, even here I have heard of somebody's hibiscus seedlings or crosses. Burbank's success no doubt has made itself felt in this individual love for plant breeding, so that after all this is a great world in this

line, where one man tries to outdo his fellow. More such work as the vineyard cited above is being done in California today and will be done everywhere else; it is for you to make a start in the right direction.

By certain methods of budding and grafting the choicest seedlings which now exist in various sections of these Islands, can be transferred to other trees and worthless trees will be changed into good reliable producers by these methods. Attention should be paid to the early and late varieties as well, for in this way you will be able to prolong your fruit harvest. The loss of years of patient waiting for a seedling to become a bearer and then the uncertainty of its quality and productiveness will all be done away with, if scientifically selected stocks, buds and scions are used. We shall be entering into an era of pedigreed fruit stock and without question only good results can be obtained by this method.

I am not going to tell you what other fruits you can plant, but suffice it to say that the Smyrna fig can be grown without question and the fig wasp, so necessary to produce this luscious fruit, is making a good beginning. I am given to understand, and I hope ere long to be able to see for myself, that in certain sections of Hawaii you have promise of raising some good deciduous fruits. The altitudes of some of the islands no doubt present favorable localities for many fruits which would thrive there as well as in other climes. The orange, lemon, lime and grape fruit should be given a fair trial at different altitudes, and the pear, peach, plum and other deciduous fruits no doubt will respond if the right locality can be found.

It has been said that in climatic conditions affecting horticulture, we have in California almost an epitome of the whole United States, besides having climatic characters peculiarly our own. You have here possibly similar conditions, but they take more the tropical or subtropical aspect. The progress already made by your various stations and individuals is encouraging and time alone can determine how successful and extensive these new ventures will become.

NEW FARMERS' BULLETIN.

Irrigation of Alfalfa. By Samuel Fortier, Chief of Irrigation Investigations, Office of Experiment Stations. Pp. 48, figs. 32. (Bulletin 373.)

This bulletin describes the lands best adapted to **alfalfa growing** in the semiarid West, and contains directions for the **removal of native vegetation**, methods of irrigating the crop, **implements used**, **seeding** with and without a nurse crop, the **production of seed, etc.**, with an estimate of expenses and profits of the crop.

REMARKS BY MR. RALPH S. HOSMER, SUPERINTENDENT OF FORESTRY, BEFORE THE HAWAIIAN RUBBER GROWERS' ASSOCIATION, DECEMBER 16, 1909.

In his story, "My Double and How He Undid Me," the late Dr. Edward Everett Hale tells of a man who, when called upon for a speech, always responded, "So much has already been said, and, on the whole, so well said, that I will not further occupy the time."

After the interesting statements that have been made today in regard to the progress of the rubber industry in Hawaii, I feel a good deal in the case of the man in Dr. Hale's story, but I am glad to appear at this meeting, if only to bear testimony of my belief in rubber as one of the diversified industries of Hawaii. It may be that rubber will not yield as high a profit as some of its more enthusiastic promoters expect, but still from its record so far, I think there is good reason to believe that rubber will take its place as one of the established industries of the Territory.

When I was assigned the subject, "Rubber and Reforestation," I suppose the secretary had in mind that I should point out the benefit of having rubber trees as a forest cover established in districts where it is desirable to conserve moisture. This is perhaps a good text for a speech, but I think I can make better use of the time at my disposal by considering the topic, not under the one heading, "Rubber and Reforestation," but rather in two parts: rubber as a type of diversified industry and the desirability of commercial tree planting. Considering the topic from this standpoint, I think it may well be made the starting point for a brief consideration of a point of view which it seems to me ought to be more generally understood by the people of this Territory, the proposition that all the land in these Islands ought to be used for the purpose for which it is best adapted, as soon as, and as intensively as, the local economic conditions warrant.

To those familiar with local conditions it goes without saying that certain sections are better adapted to given crops than are others. The rubber industry is a case in point. Rubber demands for its best development certain conditions of soil, moisture and elevation which can only be met in particular districts. The same holds true of other industries. In a comparatively new country like Hawaii an essential need is for a careful classification of the arable land. One of the essential things for which the conservation movement stands is the taking of stock. In Hawaii no more useful piece of work awaits to be done than the better classification of the lands of the Territory capable of producing agricultural crops. But to do this work systematically and on a large scale, requires larger funds and a stronger public backing of the work than now exists. It therefore becomes the duty of all those who see clearly the necessity for such an investigation, to do what they can toward creating the public sentiment which in the end will

crystalize in investigations that will produce the results desired. The members of the Rubber Growers' Association are in position keenly to appreciate the benefit that it would have been to them had there been available three years ago a soil map of this Territory. In the interest of a further extension of this industry and in anticipation of other agricultural industries which ought to be established here, I bespeak your interest and assistance in backing up those of us who are endeavoring to get Federal and other assistance in having this important work got under way.

Not to get too far away from the text of my remarks, tree planting on otherwise waste land is an example of the wise use of a given area. From the investigations of the Federal Forest Service and of others connected with the broad movement that within the last few years has come to bear the name "Conservation," it is apparent that in the future there is going to be a decided scarcity of wood. Just how serious this will be and whether or not it can be truly called a wood famine, remains to be seen, but it is beyond question that the present sources of supply will be depleted before provision can be made for the replenishment of the stock. When the time of stress comes, Hawaii will not be immune from the pressure. In this Territory we already have to pay higher prices for lumber and other wood products than are customary in many parts of the country. It behooves us, as far as we may, to provide a local source of supply. Many of the local needs for wood can be met from island grown trees. At present the special demand is for posts, ties, bridge timbers and the like, and in some districts fuel. By far the greater part of the native forests are needed for water shed protection, for it is more important that they be held to protect and safeguard the headwaters of the streams than that they be used for any other purpose. With the stricter administration of the Territorial Forest Reserves and the exhaustion of the stands of native forest outside the reserve boundaries, the local sources of wood will be lessened, which will lead directly to a rise in price and also, incidentally, to better stumpage rates for those who have wood to sell.

The argument which I wish to make to the members of this Association, as well as to all persons in Hawaii who have land suitable for the planting of trees, is that they take serious thought of establishing forest plantations, that they may be prepared when the time of stress comes not only to reap good returns themselves, but also to be able to relieve what I believe will then be a serious situation.

From the experience of the planting which has already been done during the past twenty-five or thirty years, we know that forest planting in Hawaii is not only a good thing, but an investment yielding a fair profit. We are not yet able to measure this profit in exact percentages, but we do know that the account will come out on the right side of the book. In connection with rubber growing it may or may not be possible and advisable to establish plantations of eucalyptus and other trees, but the thought that I

wish to leave with the members of this Association is that those who establish forest plantations now, will reap sufficient reward in the years to come to justify the thought and financial outlay that may be necessary to get such groves started. An ounce of prevention is worth a pound of cure. Now is the time to make sure of the ounce.

MARKETING RUBBER.

By FRED L. WALDRON.

Present prices offered for rubber naturally give us the encouragement which is desirable for the pioneer work and investment in the rubber industry in Hawaii.

On account of the small area suitable for the raising of rubber trees, Hawaii can never be a producer to the extent of influencing rather "bearing" the market value of rubber at any mart of importance.

From this fact it does not follow that we simply have to accept what might be offered by our nearest buyer, neither does it follow that we do not become a very important factor in creating a high standard which would become known and demand more than the ordinary high level of quotations.

It is not very many years since products of almost any nature were sold by the producer with little thought of grading and establishing a mark of quality. Under present conditions, the proper grading of all articles is of first importance in order to obtain full values, and the man of quality, whether he sells crude rubber or rubber shoes, is the man who buys out at his own price, and unfortunate is the man whose ideas are so ancient as to allow him to lose sight of these points.

At the present time Hawaii probably contains the most thorough and painstaking sugar growers in the world. These remarks not only apply to the *raising* of sugar but also to a systematic method of marketing.

As a contrast, I cannot pass this opportunity without mentioning the status of the producers of rice, honey, coffee and certain fruits, all of which products are being marketed without organization with the results that quite frequently a seller is placing one-half of his offerings in competition with the other half. This unfortunate condition in the case of the articles mentioned, is mainly on account of the difficulty of bringing together the different nationalities engaged in the raising of such products. Referring as an example to the rice industry in the handling of which there is no system either in the grading or marketing, it is my firm belief that for a number of years back the producers have lost an average of 50 cents per bag or say 12½%, simply by carelessness of grading and the lack of an organized exchange for marketing.

Coming back directly to the Hawaiian rubber industry, it might be said that we are taking up the item of marketing before necessary. However, it is a matter upon which we will need all the suggestions obtainable in order to perfect a proper system and receive the full measure of reward.

Under an almost perfect selling organization, the fruit growers of California have realized fortunes where they would have lost their all, had the matter of marketing been left to each individual or company.

The rubber growers of this Territory will realize similar good results, providing they market as a unit, and the results will be particularly apparent and gratifying at any time when the value of rubber is at a comparative low level of price.

From "The India Rubber World," I have taken the following comparative quotations, the figures applying to Para, other grades showing practically the same difference in price between the dates mentioned:

April 1st, 1908.....	\$.76 to \$.77
October 29th, 1909.....	1.85 to 1 87

Certainly these figures must give great encouragement to those who invested under conditions and quotations of a few years ago, but I trust these favorable conditions will in no way lead the rubber growers to overlook the necessity of a proper organization for coöperative marketing.

RUBBER IN HAWAII, 1905-1910.

By W. A. ANDERSON.

It is five years ago next month since the first Hawaiian rubber plantation was incorporated, and it would seem that this is an opportune time to "take account of stock." Before another convention of the Hawaiian Rubber Growers' Association is held at least two of the plantations will have some trees old enough to tap, and it is to be presumed that they should be ready by that time to report some tapping done. It would be highly fatuous to claim that no mistakes have been made, or that it would not have been possible, in the light of present knowledge and experience, to show better results. We are still learning, and we shall know more five years hence than we do now. But we have had some experience, and it seems fitting to consider where we stand now as compared with five years ago—as regards progress and the prospects of success.

The first plantation was incorporated January, 1905. The plans of the company were, broadly, to plant Ceara the first year, be-

believing they would yield earlier than Hevea, and to follow with Hevea planting from seeds to be obtained at the first opportunity, i. e., the fall of 1905.

The prospectus states that returns were expected from the first trees in 1909 at the rate of one-half pound per tree, to be gathered at a collection cost of 30 cents per pound, and to sell for \$1.00 per pound. It was thought that, after the land was cleared and the trees planted, little cultivation would be necessary, perhaps keeping a circle cleaned for two or three feet about each tree, and that \$75.00 per acre would amply suffice to bring the plantation into bearing.

Work was begun on this basis, and at about the same time to other plantations in Nahiku commenced operations. The first unforeseen difficulty was encountered when the young trees were transplanted from the nurseries. The rats ate most of the first planting before a method could be found of circumventing them and checking their ravages. As fast as the trees were replaced they were eaten off again. This multiplied expenses and divided profits by a large figure, and much less was realized from the year's work than was expected.

The next set back, besides, of course, the minor difficulties always met in a new undertaking, was the failure of the Hevea seeds, seedlings and stumps, obtained from Ceylon at large expense. We have since been assured by an eastern plantation manager, after describing to him the stumps obtained that they were undoubtedly from seedlings that had been discarded from the home nurseries as unfit to plant, and had been sent to us as a means of getting revenue out of an otherwise worthless asset. As these seeds can be obtained at only one season of the year it became necessary to wait for another crop. The Hevea trees planted in 1906 from these seeds gave very few normal trees. The results from seeds obtained in the fall of 1906 were even worse, about 300,000 seeds, purchased by three different plantations, produced less than 100 trees. It was not until the fall of 1907, after three years, that seeds were obtained which gave the results we had right to expect from the first. Thus Hevea cultivation has been delayed three years by inability to get good seeds, and we are just ready, practically, to begin with a good supply of trees in nurseries, and a few thousand in the fields. The inevitable result of this is that returns from rubber in the Territory for the next few years depend entirely on the Ceara tree.

For the first two years after the lands were cleared the trees grew fairly well under the scheme of little cultivation which had been adopted. Then the Hilo grass began to affect them, and finally, through various stages of partial cultivation the conclusion has been generally accepted that complete cultivation is necessary for the best results. This means, of course, that it has become more to cultivate each acre than was estimated five years ago.

The chief difficulties and disappointments then have been:

(a.) The destruction of a large part of the first planting by rats and their continued depredations.

(b.) Inability to get good Hevea seeds until after three years' effort, postponing to last year the establishment of Hevea culture on any considerable scale, and causing the expenditure of a great deal of money for which there is nothing to show.

(c.) The revision found necessary in the scheme of cultivation has raised the cost of cultivation to date on the older plantations above the original estimates for the entire period of development.

Lastly, after meeting these increased expenditures, and resulting from the difficulties mentioned, the crop from the Ceara trees is one year later than expected and from the Hevea will be at least three years later on all the pioneer plantations.

These are facts which we cannot get away from, and I believe we shall be the happier for meeting them face to face, discussing them frankly, and considering what, if any, conditions have developed to offset them.

First among these should be mentioned the general rubber market, and the chances of profit when we do get a crop. I have referred to the estimates made at the beginning which have not been realized. Let us go further. Rubber was to be obtained at a collection cost of 30 cents per pound. Reference to Dr. Wilcox's report, as published by the *Maui News* a year ago, gives exactly this estimate as the result of experiments conducted by his department in tapping Ceara trees. To quote: "Three men should be able to obtain rubber from mature trees at the rate of about one pound an hour." This means one pound for three hours' labor. Reckoning labor at \$1.00 for ten hours' work, which is ten to fifteen per cent. higher than at present, this will give a cost of 30 cents per pound, the same as estimated five years ago.

As to the selling price of rubber, the figures referred to, given five years ago, were based on an average selling price of \$1.00 per pound. A glance at the graphic representation of rubber prices since then shows that at only one time, for six months, in the five years, has the price been below \$1.00, while all the rest of the time it has been above it, and at the present time is \$2.20 per pound, and authorities agree that it is likely to stay or near the present price for some time. As witness Zeller, Vielinger & Co., in the *India Rubber World*, for November, 1909: "We do not see any chance to expect cheaper price for the next two months;" or to W. Wright & Co.: "There is no indication of a setback in values."

To be sure, complete cultivation is now generally conceived to be necessary to satisfactory results, yet I believe development in the future will be less expensive than heretofore, for it has been found that several inter-crops can be made to grow between the rubber trees with sufficient success to diminish the net cost of cultivation. From the very first cacao has been tried because it is grown successfully for this purpose in Ceylon, but it has not

thrived here, and we have turned to annual crops with the result above mentioned. Recent developments in the cotton industry, together with a very small trial planting on the Nahiku Rubber Co., lead to a belief that this may be the crop that will solve the problem, as the perennial character cotton takes on in the Territory gives it the advantage desired from cacao, that of a crop which would not require repeated planting. By the time the cotton plant will have run out to a point where picking is no longer profitable, the rubber trees will have reached the stage where the inter-crop will not seem advisable.

Anyway, it has been proven beyond question that inter-crops can be raised, and hence forth there remains only the choosing of such as will to the greatest extent diminish the net cost of cultivation. The rubber plantations occupy a position perhaps not held by any other agricultural enterprise in the islands. They can afford to raise crops between the rubber trees at an actual loss so far as the particular crop is concerned, provided they can realize from these anything over and above the cost of seed, actual planting and harvesting, as all in excess of this will lessen the cost of cultivating the rubber trees on which their hope of profit depends.

Among the older trees, where intercrops can not be grown to advantage because of the size of the trees, it will be possible hence forth as indicated by experiments covering several months, and about 100 acres on the Nahiku Rubber Company lands, to keep down weeds and grasses more cheaply with the spray pump than by the old method.

On the whole, it seems reasonably certain that development will be cheaper henceforth than it has been up to this time, even with more thorough cultivation, and it would not be surprising to see it reduced to the figures of the estimates made in the beginning.

It will be at least four years more before a crop will be obtained from Hevea trees. Our only hope of returns until the end of that time is in the Ceara. This tree has been growing in favor during the last five years, and indications point to the planting of it on considerable scale in Ceylon, East Africa and South America. It has proven by far best suited to Nahiku general conditions as regards growth and with necessity staring us in the face, I am sure that it will be made to give rubber profitably.

We find ourselves, then, at this time, with development less advanced than was expected five years ago, decidedly so in the case of the Hevea, with fewer trees of tapping age, but with the estimated collection cost, after experiment, about the same, estimated cost of development for the future, perhaps about the same, and the price of rubber about 70 per cent. higher. On the whole, I believe we may say, with a contemporary writing from East Africa concerning the Ceara planters there: "One does not care to make too many roseate prophesies, but the planters here can at

least say that, after some experience they still believe, and with more solid ground for their faith than before, in the excellent prospects of their venture."

RUBBER STATISTICS.

By D. C. LINDSAY.

There are in the islands five incorporated companies whose principal business is the growing of rubber. Statistics have been obtained from all of these and also from two individual planters.

No statistics were received from either Kauai or Oahu.

Six reports were received from Maui and one from Hawaii.

The acreage controlled by these companies and individuals is 5,599 acres.

The acreage planted at date is 1,338 acres.

Acreage planted: Hevea, 242; Ceara, 1,092; other varieties, 4; total, 1,338.

Total trees planted: Hevea, 79,940; Ceara, 349,400; other varieties, 800; total, 430,140.

Average of girth: Hevea, 2 years 6, 3 years 8; Ceara, 2 years 8, 3 years 14.

Four places practice clean cultivation. Two of them consider it absolutely necessary. One manager reports that it is entirely too expensive and two have not tried it. The approximate cost of cultivation per acre runs from \$14.00 to \$24.00 per acre for the first year and lighter for following years.

Inter-crops, such as corn, potatoes, beans, oats and green vegetables are planted on parts of two plantations. While one manager reports that pineapple has been tried, but without success.

One manager reports that inter-crops are profitable only as the returns reduce the cost of cultivation, but would not be profitable otherwise.

Only experimental tapping has been done and the result is yet undetermined. One manager reports very good results.

From reports received there are 11,000 trees that may possibly be tapped commercially during the year 1910. One plantation reports that fertilizers are too expensive to use in quantities enough to be beneficial. Two have not used them. Three places report the use of fertilizers with excellent results and one with fair returns.

For the purpose of getting statistics for next year that might be more reliable and more detailed, I would suggest that a committee of three be appointed; one on Oahu, one on Maui and one on Hawaii, and each one attend to the securing of data on the island on which he resides. These results could then be tabulated as desired.

INTER-CROPS.

By L. F. TURNER.

The question of the advisability, or otherwise, of planting 'inter-crops,' is not one that can be answered off hand; at first sight it seems to be the one thing to do, but many things have to be considered in connection with it, and the object of this paper is not to treat the matter as settled either way, or to enlarge on the advantages of any particular crop, but to endeavor to provoke a discussion which may throw more light on the subject, and by so doing benefit all who are interested.

Any crop of economic value, rubber not excepted, may be cultivated at a profit, provided soil and climate are suitable, and there is an available market for the product; some crops, however, require a much longer time than others for their development, and the problem of providing capital may easily become a very serious one.

Rubber will require more or less care for from three to five years, and during this period little or no returns can be expected. The trees can be made to grow much more rapidly by thorough and careful cultivation, and fertilizing, and if a method can be devised by which this can be done without cost to the planter it is self-evident that such method should receive the most careful consideration. It follows therefore that if an "inter-crop" will accomplish this, its cultivation is of the utmost importance. Provided,

1. That it does not rob the soil to too great an extent;
2. That it does not cost too much to render the land available for its cultivation;
3. That its cultivation does not in any way injure the rubber trees, nor check their growth;
4. That it does not draw from the labor force that is required for the extension and development of the permanent crop.

It must always be borne in mind that rubber is the object sought by the rubber planter; not corn, nor potatoes, nor cotton; if these things will contribute, well and good! But they must necessarily be of a contributory nature, or his entire policy is changed. It must also be borne in mind that he can only cultivate profitably among rubber trees (of the Ceara species at any rate) for from two to two and a half years. If the trees have been properly cared for and are as vigorous as they should be at that age their roots will by that time have met and interlaced, and the cultivation of other crops must necessarily cease.

Again, rubber trees are frequently planted on land not suitable for intensive cultivation, or, not in a suitable condition. A rough forest clearing for example, or land, too steep or too rocky for the plow. Such land may be very rich, and yet only suitable for

some crop of a permanent character, as all work on it must be done by hand. On such land as this it is questionable if an inter-crop would be of value to the rubber planter if planted and cared for at his own expense.

Another factor that must be considered is the availability of sufficient capital, or labor, for other than the permanent crop. Inter-crops mean intensive cultivation; and this cannot be done on a large scale without a large force of labor. If the income, or the labor supply is limited, it becomes a question of whether it will pay better to use the labor to increase the permanent crop as rapidly as possible, and look to it alone for eventual profit, or to use the men a part of the time for some other purpose—some “inter-crop” and limit the permanent crop to that extent by so doing.

In regard to the effect on the trees themselves, aside from the financial standpoint, my observation has been that results depend entirely on the extent to which they share in the cultivation. If they do not share, they will not only receive no benefit, but they will also have been robbed of the plant food used by the other crop.

To instance: Pineapples were planted on one of our fields of Ceara rubber; owing to the nature of the land (a mixture of a-a and broken pahoehoe), only a superficial cultivation could be given, from which the trees derived little or no benefit.

Another field with a deep rich soil had a portion of it planted with vegetables by a Japanese; he agreeing to keep the trees clean for the use of the land. The trees on this portion have nearly doubled in size since March and have cost us nothing for care. The man has just informed me that a part of this piece is no longer available as the roots of the rubber trees have taken possession of the soil. His crop was cabbages, cucumbers, melons, radishes, beans, etc., and all appeared to do well until within a short time.

Our own nursery was planted among trees 6 to 10 feet high: the thorough cultivation that this called for has improved the trees to such an extent that they stand out from all the rest of the field, and so far the seedlings have not suffered. I may mention at this point that fallen timber laying all over the fields prevents cultivation by animals, and clean and thorough cultivation by hand would in this warm, moist climate, be so expensive as to preclude its feasibility on a large scale.

It will be seen from the foregoing remarks, that, as before stated, the question is not one that can be answered in general terms; each field may present a different problem; each manager will have to study those problems from his own point of view; and no one, not fully acquainted with all the facts of the case can give him the correct solution.

HAWAIIAN POULTRY ASSOCIATION.

The fifth annual exhibition of the Hawaiian Poultry Association is announced to be held at the National Guard Shooting Gallery, Honolulu, for the four days commencing January 12 next. An attractive list of premiums is offered, which should bring out an encouraging response from breeders. All communications relative to the exhibition should be addressed to Mr. J. J. Greene, secretary of the Association, Honolulu.

Besides special Ribbons, the following is a list of the various cups and prizes open to competition:

POULTRY PRIZES.

The American Poultry Association offers a Grand Prize Silver Medal for the best cockerel in the American, Asiatic, Mediterranean and English classes, competition open to the world.

The American Poultry Association offers a Diploma for the best male under one year old in all standard varieties, competition open to the world.

TROPHY CUPS.

Governor's Cup.

The Governor of the Territory of Hawaii offers a silver cup for the largest and best exhibit of birds in the American Class.

Mayor's Cup.

The Mayor of Honolulu offers a silver cup for the best-colored Hawaiian-bred chicken, any variety, in the show.

Directors' Cup.

The Directors of the Hawaiian Poultry Association offer a silver cup to the exhibitor showing the largest number of birds in the poultry classes scoring 90 points or over.

The Hawaiian Poultry Association offers a silver cup for the best "Collection" (cock, cockerel, hen and pullet) in the American Class.

A silver cup for the best collection in the Mediterranean Class.

A silver cup for the best collection in the English class.

A silver cup for the best collection in the Game Class.

A silver cup for the best male chicken in the show.

A silver cup for the best female chicken in the show.

Mr. H. Jeffs offers a silver cup for the heaviest chicken in the show.

CASH PRIZES.

Five prize ribbons will be awarded, and cash premiums will be paid according to competition in Poultry Classes (which include turkeys, ducks and geese), viz., Cocks, Hens, Cockerels, Pullets and Pens, of all varieties, under the following schedule:

Single Birds.

	First.	Second.	Third.
Four entries or over.....	\$2.00	\$1.50	\$1.00
Three entries	1.50	1.00	
Two entries	1.00		

Exhibition Pens.

Four entries or over.....	\$5.00	\$3.00	\$2.00
Three entries	4.00	2.00	
Two entries	3.00		

RIBBON SPECIALS.

Special prize ribbons will be awarded by the Hawaiian Poultry Association for the following exhibits:

Highest scoring Hawaiian-bred bird in the show.

Best pen in the American class.

Best pen in the Mediterranean class.

Best pen in the English class.

Best pen in the Game class.

Best conditioned bird in the show.

Best shaped male in the show.

Best shaped female in the show.

Best parti-colored male in the show.

Best parti-colored female in the show.

Best solid-colored male in the show.

Best solid-colored female in the show.

Best live Capon.

Heaviest Tom.

Best 12 white eggs.

Best 12 brown eggs.

Best 12 duck eggs.

ENTRANCE FEE.

The entry fee for each specimen in the open class is \$1.00. Exhibition pens (1 male and 4 females) \$3.00. Turkeys, ducks and geese, \$1.00 each. Birds entered in exhibition pens cannot compete in open classes.

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

Division of Entomology.

Honolulu, Hawaii, Dec. 1, 1909.

Honorable Board of Commissioners of Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen: I respectfully submit my report of the work of the Division of Entomology for the month of November.

Of 30 vessels boarded we found fruit, plants and vegetables on 17. These shipments received the usual rigid inspection and were disposed of in the following manner:

<i>Disposal with principal causes.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	861	16,638
Fumigated before releasing.....	9	16
Burned	7	12
Total	877	16,666

POSSIBLE PESTS INTERCEPTED.

From a small shipment consisting of rice, beans, peas and other vegetable seeds brought in for experiment purposes on the last day of October per steamer China, we have bred the following insects: Two species of moths belonging to the Tineidae, the drug beetle, *Sitodrepa panicea*; two weevils, *Calandra oryza* and *Calandra liniaris* and *Palorus ratzeburgi*; all cosmopolitan species. The shipment was treated with carbon bisulphide for 24 hours and after finding all insects dead was released.

In a shipment consisting of three baskets of Pomelos from China we found seven species of scale insects, a lepidopterous larva boring in the rind and a *Cladosporium* species, probably *C. citri*, infesting the skin. The shipment was burned.

Several small lots of plants were found infested with a few of the commoner scale insects and aphids and were fumigated before delivery.

Only one sending of Queenbees arrived during the month, and after the usual custom of securing the Queen in a new cage, the old cage with contents was burned.

We received four shipments of hornfly parasites from Mr. Koebele, three of these containing the same species which arrived last month and all were turned over to Mr. O. H. Swezey. I am pleased to be able to report that three large colonies of home-reared parasites (Alysids) have been liberated on favorably located dairies. The last shipment from Mr. Koebele contained a good colony of *Aphodius finitarius*, a carabid beetle which may

be considered a good factor in preventing maggots of the hornfly and other stable flies from propagating in manure owing to the beetle's habit of feeding on the fresh dung and disturbing the droppings in such a manner by its own work and that of its larvae, to cause the quick drying up of these, thus reducing the breeding places of the flies materially. We shall soon be able to liberate these beetles at higher elevations as recommended by Mr. Koebele.

On account of the sudden abundant appearance of several species of the commoner scale insects in a few gardens about town, we have received inquiry about parasites and general advice. All these matters are receiving our attention.

Very truly yours,

EDW. M. EHRHORN,
Superintendent of Entomology.

Honolulu, Hawaii, Dec. 2, 1909.

Prof. J. Kotinsky,
Assistant Entomologist,
Honolulu.

Dear Professor:

ACCOUNT OF INSPECTION FOR NOVEMBER.

Of the nine foreign vessels that entered Hilo Bay, three brought inspection matter.

There were 121 lots and 2,043 parcels. Five cases of lemons were fumigated on account of purple scale, and fifty sacks of River spuds received an overhauling before being passed.

Yours truly,

BRO. M. NEWELL,
Inspector, Hilo.

Division of Forestry.

ROUTINE REPORT.

Honolulu, Hawaii, December 3, 1909.

*The Board of Commissioners of Agriculture and Forestry,
Honolulu, Hawaii.*

GENTLEMEN:—I have the honor to submit the report of the Division of Forestry for the month of November, 1909:

ARBOR DAY.

During the first half of November, practically the entire time of the staff of the Division of Forestry was devoted in one way or another to the free distribution of trees for Arbor Day planting that this year formed a special feature of the observance of that day. By proclamation of Governor Frear, November 12 was designated Arbor and Conservation Day, and was generally observed throughout the Territory. Mr. Haugh's report which is submitted herewith, gives the details of the distribution, both from the Government Nursery and from the sub-stations that have been established on the other islands. It will be seen that altogether over 62,000 trees were given out.

ADDRESS BEFORE HAWAIIAN SUGAR PLANTERS' ASSOCIATION.

On Tuesday afternoon, November 16, I gave a brief talk before the members of the Hawaiian Sugar Planters' Association.

EUCALYPTUS STUDY.

On November 29, Mr. Louis Margolin, Forest Examiner in the U. S. Forest Service, arrived from San Francisco to undertake the examination of the planted eucalyptus forests in Hawaii, the study to be carried on jointly by the Division of Forestry and the U. S. Forest Service. During the last days of the month I have devoted considerable time to putting Mr. Margolin in touch with the local situation, through visits to Tantalus and Niihau.

The object of the investigation is to ascertain from existing groves, figures that can be used in estimating probable returns from eucalyptus plantations. A part of the investigation will consist of measurements of felled trees. For some time, since the control of the forest on Tantalus has come back into the Government's hands, it has been the intention of the Division of Forestry to do certain thinning in the planted forest of Tantalus. The opening up of some of the closer stands of the Tantalus forest will be begun in the near future. The trees that are cut in this way can also be utilized in the present investigation. All the cutting will be done under the personal supervision of the representatives of the Division of Forestry.

MAINLAND TREES FOR THE HIGHER MOUNTAINS.

By the Alameda, arriving on November 26th, there were received a shipment of 1,000 trees of each of the following four kinds, from one of the Forest Service Nurseries near San Bernardino, Southern California: Jeffrey Pine, Coulter Pine, Incense Cedar, Deodar Cedar.

These trees were immediately transshipped in equal lots for planting respectively, on the upper slopes of Mauna Kea and

Haleakala. The trees came through in excellent condition and as they were forwarded without delay to the planting stations, it is expected that they will do well.

OPENING OF NURSERY GROUNDS.

During the week beginning November 7, the fence around a considerable portion of the Government Nursery was removed, the grounds being opened up freely to the public as a park. This step, which has been contemplated for a considerable time by the Board, apparently meets with very general satisfaction on the part of the people of Honolulu.

REORGANIZATION OF CLERICAL STAFF.

On November 22, the clerical staff of the Board of Agriculture and Forestry was reorganized through the appointment of Miss Elsie M. Kuhn, as general stenographer for the Board, the transfer of Miss Melika Peterson to be stenographer of the Divisions of Entomology and Animal Industry, and of Miss Ella K. Dayton to be librarian of the Board.

THE HAWAIIAN POULTRY ASSOCIATION.

The Hawaiian Poultry Association held a meeting in the office of the Board on the evening of November 11, 1909.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF THE FOREST NURSERYMAN.

Honolulu, Hawaii, December 6, 1909.

*R. S. Hosmer, Esq.,
Superintendent of Forestry,
Honolulu, Hawaii.*

DEAR SIR:—The following is a report of the work done during the month of November:

ADVICE AND ASSISTANCE.

On November 26th, at the request of Mr. E. C. Winston, the writer paid a visit to Pupukea homesteads, Koolauloa, Oahu, for the purpose of examining two tracts of land that have been set aside as water reserves—one being on lot 5 and the other on lot 6-A. The object of the visit was to study on the ground the conditions in regard to tree planting. The Pupukea homesteaders have agreed to plant both the reserves providing the Board sup-

plies the trees. Planting plans for the two tracts are being prepared and a quantity of trees are on hand to be shipped when the homesteaders are ready.

NURSERY.

Arbor Day.—At the beginning of the month the packing up of trees for Arbor Day commenced. The packing and shipping of trees to the other islands entailed a good deal of work, and all the men employed at the Nursery, including the two seed boys and three men from the Makiki Station, were kept busy for about two weeks filling the orders from the other islands. The applications from people residing in the neighborhood of Honolulu and outside districts of Oahu were also quite large.

Altogether 41,777 trees have been distributed from the Nursery to the different islands, as follows:

Hawaii	7,211
Maui	9,099
Kauai	5,983
Oahu	16,682
Molokai	2,778
Lanai	24
	<hr/>
	41,777
Churches received	3,858
Public schools	3,844
Private schools	608
General public	33,467
	<hr/>
Total	41,777

Reports from the officials in charge of the sub-nurseries on the other islands gives the total number of plants distributed 20,337. Divided as follows:

Hawaii—Bro. Matthias Newell, Hilo, 3,500 trees.

Maui—Mr. L. von Tempsky, Haleakala Ranch, 4,577 trees; Mr. H. B. Penhallow, Wailuku, 1,163 trees; Mr. John Chalmers, Hana, 8,000 trees.

Kauai—Mr. Walter McBryde, Wahiawa, 3,097 trees.

Grand total for all the islands, 62,114, including the 41,777 distribution from the Government Nursery in Honolulu.

Mr. Walter McBryde also reports that his private planting for Arbor Day amounted to 6,000 trees. These were planted on Ku-kuinolono Hill.

The sum of \$16.50 has been received for plants and seed sold, and \$11.50 for dead wood taken from Tantalus Forest.

The approximate number of trees on hand at the Nursery and Makiki Station amounts to about 75,000. The principal species being:

Lemon Gum (*Eucalyptus citriodora*).
 Blue Gum (*Eucalyptus globulus*).
 Swamp Mahogany (*Eucalyptus robusta*).
 Silk Oak (*Grevillea robusta*).
 Ironwood (*Casuarina equisetifolia*).
 Highland Ironwood (*Casuarina quadrivalvis*).
 Pepper Tree (*Schinus molle*).
 Japanese Cedar (*Cryptomeria japonica*).
 Monterey Cypress (*Cupressus macrocarpa*).

About 35,000 are in seed boxes; 16,000 in transplant boxes and 24,000 in pots. Our supply of ornamental trees, such as Royal Poinciana (*Poinciana regia*), Pink and White Shower (*Cassia nodosa*), Pink Shower (*Cassia grandis*), Golden Shower (*Cassia fistula*) and Jacaranda (*Jacaranda memosaefolia*) is exhausted, the demand for these being larger than was expected. Those species will be propagated just as soon as the seed can be procured.

EXPERIMENT GARDEN, MAKIKI.

One man was left at the garden to look out for the plants, etc., while the others were assisting in packing up trees at the Nursery.

NUUANU STATION.

The man at the station has been doing the regular routine work, clearing out vines and looking out for estrays.

Very respectfully,

DAVID HAUGHS,
 Forest Nurseryman.

NEW FARMERS' BULLETIN.

Care of Food in the Home. By Mrs. Mary Hinman Abel. Prepared under the supervision of the Office of Experiment Stations. Pp. 48, figs. 2. (Bulletin 375.)

In this bulletin the author discusses yeasts, molds, and the spoiling of foods, dust, and pet animals in relation to food; the sanitation of markets and bakeries; the quality of meats and vegetables; the storing and keeping of raw and cooked foods; suggestions for washing food products; dishwashing; care of the kitchen, etc.

KOHALA MOUNTAIN FOREST RESERVE.

On the afternoon of October 18, 1909, a public hearing was held in the Throne Room at the Capitol, to consider the addition to the proposed Kohala Mountain Forest Reserve of certain privately owned forest lands in the section above the sugar plantations in the Kohala District. The meeting was called by the Board of Agriculture and Forestry and was attended by a representative gathering of the men who shape the course of affairs in Kohala. The result of the meeting was an understanding which it is expected will lead to definite action in regard to the setting apart in the near future as a permanent forest reserve of one of the most important forest areas on the island of Hawaii.

The creation of a forest reserve on the Kohala Mountain was one of the first projects undertaken by the present Board of Agriculture and Forestry on its organization in 1903. In December, 1904, a portion of the mountain was set apart as the Hamakua Pali Forest Reserve, but owing to a variety of reasons it has been impossible up to this time to secure comprehensive action for the mountain as a whole. The point seems now to have been reached, however, when the entire summit of the Kohala Mountain will shortly be officially set apart. Consequently it is appropriate that there now be made public, in accordance with the usual custom of the Board, the reports of the Superintendent of Forestry and of the Committee on Forestry in regard thereto, together with a full transcript of the discussion at the hearing of October 18.

These reports give the history of the efforts that have been made to establish this reserve. From the present indications it ought not to be long before a portion of an issue of the "Forester" can be devoted to the formal proclamation announcing its actual creation.

REPORT OF THE COMMITTEE ON FORESTRY.

Honolulu, December 3, 1908.

*Board of Agriculture and Forestry,
Honolulu, Oahu.*

SIRS:—Your Committee on Forestry have had under consideration the report of R. S. Hosmer, Superintendent of Forestry, under date of October 14, referring to the proposed Kohala Mountain Forest Reserve in the Eastern portion of North Kohala, and in West Hamakua, Island of Hawaii, and hereby recommend:

That, while approving of the recommendations of Mr. Hosmer, we do not feel that they go far enough in the protection of the water-shed of the Kohala Mountains, and therefore further recommend that not only the area proposed by Mr. Hosmer, but the

additional area suggested by him on page 8 of his said report, together with the small additional area as shown on the 1901 map of the island of Hawaii—marked in blue—(the said map accompanying the Governor's Report of 1906), be included in the said Forest Reserve.

And the Committee further recommends that the Superintendent of Forestry be instructed to at once proceed without further delay to locate said proposed additional area, as above recommended, and report back to the Board at the earliest date possible.

Yours truly,

H. M. VON HOLT,
Chairman;
W. M. GIFFARD,
C. S. HOLLOWAY.

REPORT OF THE SUPERINTENDENT OF FORESTRY.

Honolulu, Hawaii, October 14, 1908.

*Committee on Forestry,
Board of Agriculture and Forestry,
Honolulu, Oahu.*

GENTLEMEN:—I have the honor to submit herewith a report with recommendations on the proposed Kohala Mountain Forest Reserve in the Districts of Kohala and Hamakua, Island of Hawaii.

LOCATION.

The section included in this proposed forest reserve may roughly be described as embracing the area of existing forest on the Kohala Mountain not already included in the Hamakua Pali Forest Reserve, together with the private forest reserve above Kukuihaele, maintained for many years by the Pacific Sugar Mill Company, and the two forest covered gulches at the west end of the mountain, Honokane and Pololu, owned respectively by the Bishop Estate and by the Government. The total area of the proposed Kohala Mountain Forest Reserve is approximately 27,160 acres.

OBJECT.

The Kohala Mountain Forest Reserve is created essentially as a protection forest to assist in the conservation of water on the Kohala Mountain. The Kohala Mountain lies between two districts that contain considerable areas of land that can only be made productive in a large way through irrigation. As it is the only available source of water supply for these districts, the Kohala Moun-

ain is justly to be regarded as one of the very important watersheds of the Territory. Through the enterprise of two responsible corporations, the Kohala Ditch Company and the Hamakua Ditch Company, water for irrigating cane land is already led out from the windward slopes of the mountain, both into Kohala and into Hamakua. From the leeward face of the mountain water is also piped out onto the Waimea plain, for domestic use and for watering stock. In the full economic development of these several sections every drop of water that can be got is urgently needed. Especially is this so in view of the probability of the development before many years of the Waimea Plains as a place of residence for many people. It is therefore not only wise but from a far-sighted economic standpoint imperative that all reasonable steps be taken to protect, to safeguard and if possible to increase the sources of supply.

The elevation of the Kohala Mountain, 5,505 feet, is sufficient to make the mountain serve as a point around which the moisture laden trade wind clouds congregate and are held to precipitate their contents. But the mountain is not high enough to serve as a complete barrier to the passage of the trade wind clouds. neither is it large enough in area to make its catchment basins of sufficient size to yield any great quantities of water. For these reasons it is the more important that conditions favorable to a sustained flow, through the retardation of run-off be maintained.

DESCRIPTION.

The setting apart of the Kohala Mountain as a forest reserve has been under consideration ever since the passage of the forest reserve law in 1903. The Kohala Mountain was the first forest area in the Territory visited by me after my arrival in 1904. But because of one reason and another, among which the long continued litigation over the Parker Ranch played no small part, it has not been found feasible to bring the project to the point of action until now.

TOPOGRAPHY.

The Kohala Mountain is the lowest of the four mountains that make up the island of Hawaii. It forms the northern point of the island and with its abrupt palis cuts off the even slope of the Hamakua District from the similarly situated land in Kohala. As is characteristic of windward slopes in Hawaii, the northeastern side of the Kohala Mountain rises abruptly from the sea. The high wall, deeply cut by gulches and lesser valleys, each with its stream of water falling over the bluff into the ocean, adds much to the picturesqueness of the coast. On the southern and western sides of the mountain the slope is less steep, but owing to the dense cover of vegetation and the boggy character of the ground the

mountain is rendered difficult of access and is consequently relatively unexplored.

On the windward slopes the only means of access are the trails in connection with the irrigation projects and those along the bluffs near the sea that connect the limited areas of agricultural land in the bottoms of the larger gulches.

Within the limits of the proposed forest reserve the Kohala Mountain is clothed with a dense mass of indigenous vegetation--a cover that for its effect on run-off and for holding back moisture after it once reaches the ground cannot be surpassed.

OWNERSHIP.

Of the lands in the proposed Kohala Mountain Forest Reserve the larger part belong to the Territory. Out of the total area of 27,160 acres, 14,365 acres, or 53 per cent., are Government lands. Next in order of ownership comes the Bishop Estate with 8,970 acres, or 33 per cent. The more important of the remaining lands are owned by the Kohala Sugar Company, the Parker Ranch, the Queen Emma Estate, the Pacific Sugar Mill, and by one or two individuals. The accompanying list shows the name, ownership, area, (and in the case of the Government lands the lessee, lease number and date of expiration of the existing lease) for all the lands in the reserve. (See Appendix.)

BOUNDARY.

In selecting the boundaries of the proposed Kohala Mountain Forest Reserve natural barriers have so far as possible been followed. Where this was not feasible the boundary has been made to conform to existing fence lines for the maintenance of which provision has in most cases been made. Thus on the face of the mountain above Waimea the reserve boundary follows the upper fences of the Parker Ranch paddocks. So far as possible in the renewal of the leases of Government lands, provision should be made for the maintenance of these fences as one of the terms of the new lease. Across other lands it will often be necessary to keep up the fences by other means. At present the forest reserve line above Waimea is kept intact through the interest of the manager of the Parker Ranch, Mr. A. W. Carter, who, realizing the value of a forest cover on the mountain, has built a number of stretches of fence on the face of the mountain to complete the line.

It is a recommendation that tends to become trite through repetition that there should be a fund available in this department from which necessary stretches of forest fence could be built in localities where the interests of the Government would otherwise suffer. It is a recommendation that must and will continue urgently to be made until such a fund is provided.

The portion of the Kohala Mountain Forest Reserve that has been reserved by the Pacific Sugar Mill Company as a private

reserve is at present fenced and will continue to be maintained by that company as it has been for the past twenty years. For the present the gulch lands at the northwest end of the mountain are not in need of artificial barriers.

It may perhaps be appropriate to note here that the owners of private land within the proposed Kohala Mountain Forest Reserve are in full sympathy with the aims and object of the Government in creating the reserve and in recommending the reservation of this area. As has already been stated the Bishop Estate is, next to the Government, the largest owner of land in the reserve, controlling as it does 33 per cent.

Because of the present inability of the Government to provide for the definite and systematic administration of its forest reserves through a forest ranger organization, the Trustees of the Bishop Estate are not ready to turn their lands over to this department for management, but they are perfectly willing that their forest be included within the reserve limits, as it is their intention to continue themselves to maintain these lands as a forest reserve.

Much the same is the condition under which the private forest reserve of the Pacific Sugar Mill is included as a part of the Kohala Mountain Forest Reserve, except that in this case the inclusion of these lands gives, as it were, an official recognition of the far sightedness of that company.

For over twenty years the Pacific Sugar Mill has maintained at its own expense some 2,800 acres of land as a private forest reserve. This area protects the source and catchment area of the Lalakea stream, tributary to the Waipio Gulch, which is used on the plantation, and also Kukuihaele Spring, near Kukuihaele, one of the very few sources of water in Hamakua that can be depended on even in long periods of drought. When the reserve was established much of the land was fairly open. Thanks to continued protection by carefully kept up fences there has resulted a marked increase in vegetation through natural reproduction. Especially is this true of the last few years, when original conditions have been more nearly approached by the coming back of ferns, shrubs and small trees.

The planting of introduced forest trees has also helped in this regard.

Because of its running streams and its proximity to the densely forested section to the west of Waipio Gulch the Kukuihaele private forest reserve is in a different case from the remainder of the Hamakua forest belt. This being so different treatment is indicated and the permanent reservation of the area becomes a step of economic wisdom.

The other principal holders of private land in the proposed Kohala Mountain Reserve, the Kohala Sugar Company and the Parker Ranch are also in favor of the creation of the reserve and have manifested their interest in a tangible way by the erection and maintenance of forest fences along certain portions of the reserve boundary and by keeping under forest certain lands which

by the terms of their leases or by being in fee simple ownership could have been opened for cattle grazing.

To meet the objection that can very pertinently be raised that too much dependence in the management of this and other Hawaiian forest reserves is now placed on the good will of private corporations and individuals it has frankly to be admitted that the present condition is far from satisfactory. The condition is one that can only be remedied by the organization of a salaried forest ranger service, responsible to this department alone. Toward this end the energies of the Division of Forestry will continuously be directed until such a force is secured.

In the meantime the work of formally setting apart forest reserves finds its justification in that it is a necessary and essential step in the right direction—one that must be taken before plans for the forest to do its full part in the development of the Territory can be put into effect.

DESIRABLE EXTENSION OF THE RESERVE.

In addition to the area now recommended to be set apart, it is my belief that the Kohala Mountain Forest Reserve should be extended to include the forested section immediately adjoining and to the west of Honokane and Pololu gulches. This section is made up of the privately owned lands of Kahua 1 and 2, Kehena 2, and the area of forest above the Niulii, the Halawa and the eastern part of the Kohala Sugar Company's plantations that has for some years been held as a private forest reserve. This area is not included in the proposed Kohala Mountain Forest Reserve at this time because of complications arising out of uncertainty as to the use to which certain of the lands may at any moment be put by their owners. Several attempts have been made to bring about action that would result in the permanent setting apart of this area as a forest reserve, but so far nothing tangible has resulted. The matter is, however, still under advisement; in time something may be accomplished.

As a matter of record and as one step toward the desired end I may state here that it is my judgment that there should be added to the Kohala Mountain Forest Reserve the area lying to the west of Honokane and Pololu gulches bounded as follows:

Beginning at the Pololu Gulch at the eastern makai corner of the private forest reserve of the Niulii plantation, and following the makai boundary of the said reserve and its extension across the lands back of and above the Niulii, Halawa and Kohala Sugar Companies' plantations to its western extremity back of and above the Kohala Sugar Company's mill; thence following the western boundary of the reserve up to the land of Kehena 2; thence easterly along the makai boundary of Kehena 2 to the Hooleipalaoa Gulch; thence following up the western (outside) edge of the said gulch to its source in a little pond just north of Puu Pili, to the summit of Puu Pili; thence northerly, along the boundary

of the Kohala Mountain Forest Reserve to the point of beginning. These should also be included in the reserve the south side of Puu Pili, to protect certain springs on the lower slope of that hill.

In my judgment it is very markedly to the best interests of the Kohala District that all the land within the limits just defined should be held permanently under a forest cover. There is a very considerable area of agricultural land in Kohala that can only be made productive through irrigation. The water bearing area on which the Kohala district has to depend for its supply is at best limited. Large expenditures have been made to bring out water from this area onto the agricultural lands in Kohala. In such a case it is obvious that all possible sources of supply should be turned to account. In the section under discussion there are several springs and brooks that while they are not large are yet of altogether too much importance to be lost sight of. In addition to its value as an actual source of water, this section is also important in that it serves in a measure to protect the forest land lying behind it, on the main slope of the mountain. There is always a tendency in the Hawaiian forest for the edge of the woods to be open and in poor condition. Such an area as is now under consideration serves as a buffer and protects the main reserve behind.

With the statement that all the water that can be made available is needed in the development of the Kohala district, it follows as a corollary that all the available sources of water should be carefully protected. The recession of the forest in the Kohala district is one of the most marked examples of the change in natural conditions that is to be found anywhere in the Territory. If the edge of the forest is permitted to be pushed further back it is my belief that the consequences to the lower lands will be serious. The use for cattle grazing of the forest that now remains decreases in direct proportion the opportunity of making productive the more valuable lower lying lands, from which could be secured larger returns than would ever be possible from raising cattle on the uplands. Individual owners cannot be blamed for making what for their personal interests may appear to be the best use of their own land. But considered from a broad economic standpoint it is very decidedly to be lamented that an area of potentially good agriculture land should be curtailed through the opening up of water-bearing forest areas that should be kept permanently under a dense cover of vegetation.

Owing to the diversity of interest it has been impossible so far to secure the adoption of a comprehensive plan whereby this section could be protected, although such plans have from time to time been proposed and diligently advocated by different persons. At the present time renewed efforts are being made to bring about some sort of a feasible arrangement. But in view of the present uncertainty and the bearing which some of the complications of the past have on the present situation, it has been deemed wise to postpone definite recommendations concerning the reservation of this section until some future time. The present section of this

report is therefore to be regarded in the nature of a report of progress. It is my hope that it will be followed in due time by a statement of results accomplished.

RECOMMENDATIONS.

For the reasons set forth in the foregoing pages I now recommend that the Board request the Governor of Hawaii to create, in accordance with the law and following the usual method, the Kohala Mountain Forest Reserve, and to set apart as units thereof the Government lands within the boundary officially described by the Government Survey Office.

The Government lands are in two classes, those not under lease, and those on which leases have still some time to run. Those not under lease can be definitely set apart at once; on the others the full reservation takes effect automatically at the expiration of the lease. The lands not under lease are: Pololu 1,000 acres; Awini 100 acres; Pauahi 150 acres, and Lanikepu 435 acres; a total of 1,685 acres. Those on which leases have still some time to run are Kawaihae 1, 3,370 acres; Puukawaiwai-Panoluukia-Kapia 360 acres; Momouloa 130 acres; Puukapu 8,570 acres; Kamoku 20 acres, and Keaa 230 acres; a total of 12,680 acres. Altogether there are 14,365 acres of Government land.

OFFICIAL DESCRIPTION OF BOUNDARY.

[In the original there follows the official technical description of the proposed Kohala Mountain Forest Reserve prepared by the Government Survey Office as C. S. F. No. 1960, and shown on Government Survey Registered Map No. 2060. This is omitted here as it will be given in full later, in the formal proclamation. The total area of the Reserve is 27,160 acres.]

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

NEW FARMERS' BULLETIN.

Game Laws for 1909. By T. S. Palmer, Henry Aldys, and C. E. Brewster, Assistants. Biological Survey. Pp. 56, figs. 2. (Bulletin 376.)

A summary of the provisions relating to seasons, shipments, sale, limits, licenses, etc., for game in the United States and Canada, with an appendix showing open seasons under the county laws of several States. This bulletin supersedes Farmers' Bulletin 336.

[Government lands only]

Kohala District.

Pololu	Government	Not leased	1,000
Honokane	Bishop Estate		5,410
Awini	Kohala Sugar Co.		500
Awini	Government	Not leased	100
Waika	J. F. Woods		190
Kawaihae 1	Government	113-A	3,370
Kawaihae 2	Queen Emma Estate		120

Ilis in Waimea—

Puukawaiwai-Panoluukia-

Kapia	Government	50	Parker Ranch	July 1, 1913	360
Pauahi	Government	Not leased			150
Momouloa	Government	8	Parker Ranch	July 1, 1913	130
Ouli	Parker Ranch				190
Lanikepu	Parker Ranch				25
Lanikepu	Government	Not leased			435
Waikoloa	Parker Ranch				250
Puukapu	Government	39	Parker Ranch	July 1, 1913	8,570
Total area in Kohala					<hr/> 20,800

Hamakua District.

Waipio	Bishop Estate				3,560
Lalakea	Pacific Sugar Mill				1,540
Kukuihaele	Pacific Sugar Mill				10
Waikoekoe	Pacific Sugar Mill				1,000
Kamoku	Government	593	Parker Ranch	Sept. 8, 1928	20
Keaa	Government	593	Parker Ranch	Sept. 8, 1928	230
Total area in Hamakua					<hr/> 6,360
Grand total					<hr/> 27,160

KOHALA MT. FOREST RESERVE HEARING.

Minutes of a hearing re extension of proposed Kohala Mountain Forest Reserve, held by the Board of Commissioners of Agriculture and Forestry, in the Throne Room, October 18, 1909.

Present: Board of Agriculture and Forestry—Messrs. Marston Campbell, President; H. M. von Holt, D. P. R. Isenberg and J. M. Dowsett, and Superintendent of Forestry R. S. Hosmer.

Governor Frear and Messrs. A. W. Carter, F. S. Dodge, T. H. Petrie, F. M. Swanzy, H. Holmes, A. W. T. Bottomley, A. Lewis, E. A. Knudsen, H. L. Holstein, A. G. M. Robertson, P. W. P. Bluett, J. S. Low, John Hind, A. Mason, G. C. Watt, J. T. Taylor, J. W. Waldron, O. Sorenson, J. T. McCrosson, S. M. Kanakanui, F. J. Testa, J. Jorgensen, H. R. Bryant and L. G. Blackman.

(Various maps showing the proposed reserve were displayed.)

Mr. Campbell. Gentlemen:—On September 24, at a meeting of the Board of Agriculture and Forestry, I was directed to issue an invitation to all those in the district of Kohala interested directly or indirectly in the Kohala Forest Reserve, to attend a meeting at this place with the Board of Agriculture and Forestry.

The last Legislature of the Territory made it possible for the Board of Agriculture to take some definite action in regard to reforesting portions of the Islands. It has been recognized that the proposed Kohala Forest Reserve is one of the most important, and there has been, I believe since 1904, an effort made toward accomplishing something in this particular reserve. There has, however, never been any united action between those interested and the Government. There has been somewhat of a diversity of opinion as regards the aid which might be given by those directly benefitted by the forest reserve. It was thought that this meeting would bring us closer in touch and possibly result in something which would work toward the solving of this problem.

The Board of Agriculture and Forestry, under the provisions of the Immigration-Conservation Act, is now in a position, provided it receives certain aid from those interested, to go ahead with this forest reserve, and we have asked you here to meet us on this proposition.

I think it would be well to get, if possible, a record of those who are here and particularly what interests they may represent, and if there is no objection, I will ask those present to respond to that question. Mr. Bluett?

Mr. Bluett. I am really representing the Woods Estate in this matter, owners of Kehena 2, but that matter has been referred to Mr. Robertson here as the attorney for the Estate; he was appointed to represent the Estate.

Mr. Campbell. Mr. McCrosson, are you representing any particular interest, either directly or indirectly in this matter?

Mr. McCrosson. I am particularly interested in the conservation of the forest outline made here, on account of the Kohala and Hamakua ditches.

Mr. Campbell. Well gentlemen, instead of asking each one of you the question, would you have any objection to letting us know, so that I may know who is represented here? Mr. Dodge, are you representing the Bishop Estate?

Mr. Dodge. Bishop Estate.

Mr. Swanzy. I represent the Union Mill Company, and Mr. Hart, Niulii and Makapala.

Mr. Hind. I represent the Kohala Plantation Company, and also the Ditch.

Mr. Campbell. Mr. Petrie?

Mr. Petrie. Kohala Sugar Company.

Mr. Campbell. Mr. Watt?

Mr. Watt. Kohala Sugar Company.

Mr. Campbell. Mr. Carter?

Mr. Carter. Parker Ranch and Bishop Estate.

Mr. Campbell. Mr. Sorenson?

Mr. Sorenson. Bishop Estate.

Mr. Campbell. Mr. Mason?

Mr. Mason. Puakea Ranch.

Mr. Campbell. Mr. Low?

Mr. Low. J. F. Woods, Kahua Ranch.

Mr. Bottomley. I represent the Austin Estate and Bishop Museum.

Mr. Campbell. Mr. Waldron?

Mr. Waldron. Pacific Sugar Mill and Honokaa Sugar Co.

Mr. Bryant. Puakea Plantation.

Mr. Campbell. Sometime ago I asked Mr. Hosmer, who has had this matter in hand for a number of years, to write me a little report covering the essential features. I will read that report.

Honolulu, Hawaii, July 24, 1909.

Hon. Marston Campbell,

President and Executive Officer,

Board of Agriculture and Forestry,
Honolulu.

Dear Sir: In reply to your request of July 13, it gives me pleasure to hand you the following statement in regard to the present status of the proposed forest reserve on the Kohala Mountain:

The project to create a forest reserve on the Kohala Mountain was one of the first to receive attention on the definite organization of the Division of Forestry in January, 1904. The obvious

needs of the situation pointed to the necessity for prompt action but owing to a variety of circumstances the actual setting apart of this reserve has been again and again delayed. Chief among the reasons for the delay were the prolonged litigation over the Parker Ranch and the difficulty of bringing to the point of action the various interests concerned with the reservation of certain private lands in Kohala proper that are needed to complete the forest reservation.

In October, 1908, I submitted a report recommending the reservation of the summit of the Kohala Mountain, embracing "the area of existing forest not already included in the Hamakua Pali Forest Reserve, together with the private forest reserve above Kukuihaele, and the two forest covered gulches at the west end of the mountain, Honokane and Pololu, a total area of approximately 27,160 acres." I recommend further that as soon as practicable there be added to this reserve the forested section above the Kohala plantations, now in private ownership, and the lands of Kehena 2, Kahua 1 and 2 and Waika. On the 3rd of December, 1908, the Committee on Forestry recommended that this area be included with that originally recommended, and that steps be taken to secure a complete description so that the whole area might be set apart as a reserve. I immediately requested the Survey Department to complete the survey of this area. The field work has been done and the data is now in such shape that a description can quickly be compiled. The description has not yet been furnished, however, because in the meantime the question of the turning over of the private lands to the Government has reached the point where it seems advisable to have the compilation of the description await the definite settlement of boundaries on the ground.

From a number of visits to Kohala and a careful study of the situation in its various aspects, it is my judgment that for the best interests of all concerned there should be permanently maintained under a forest cover the area that for some years has been treated as a private forest reserve above the plantations, together with that section of the Kehena and Kahua lands lying within, that is to the east of, the Hooleipalaoa Gulch, which starts on the northern slopes of P'u Pili. This is, I believe, the best boundary that could now be selected for this portion of the forest reserve for much of the way its banks are steep enough to form a natural barrier, and it is as good a dividing line as can now be selected between the land that should be held in forest and that which is proper to be used for grazing.

All the area proposed to be added to the Kohala Mountain Forest Reserve is in private ownership. Because of the beneficial influence which I believe this area of forest exerts on the adjacent lands, I have always held that the plantation interests should bear the major portion of the cost of its reservation. In so doing they would only be acting as have private interests in other districts in the Territory. I believe that it would be fair for the different

plantation companies and those interested in the lower lands which will be benefited by the water to be obtained from this forest reserve, to pay 75 per cent. of the cost of acquiring the additional private lands that are needed to round out the reserve. This would leave one-fourth to be borne by the government. Working on these lines I tried two years ago to effect an arrangement between the plantation interests and the Woods Estate, but without success. During the recent session of the Legislature I brought the matter up again and arranged a number of conferences among those interested. The outcome of these meetings was a proposition on the part of Mr. John Hind that the plantations might get together on a basis of land ownership. I accordingly had Mr. Kanakanui of the Survey Office draw up a table showing the portion of agricultural land owned by the different plantations. The proposition in this form did not meet with the approval of the representatives of several of the Kohala plantations. Accordingly, a revised plan was suggested which is now being worked up by Hon. H. L. Holstein. Mr. Holstein's proposition is that the corporations desiring to buy the forest land get together on a basis of productive value rather than area. He is now at work on this plan. In the past it has been difficult for the prospective purchasers and the owners of the land to arrive at anything like a common figure.

I am sending you herewith a copy of my report dated October 14, 1908; of the report of the Committee on Forestry dated December 3, 1908, and of a map of the areas proposed to be reserved, that was drawn up by Mr. S. M. Kanakanui of the Survey Office. It should perhaps be noted that when the line comes finally to be fixed the reserve should include a small group of trees on the south and west sides of Puu Pili.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

Mr. Campbell. I will also read a resolution, signed by John Hind and others, adopted at a meeting of the Kohala plantation managers, last January:

Kohala, Hawaii, January 30, 1909.

Whereas, the matter of Forest Reservation is of paramount interest to all concerned in all parts of the country, and

Whereas, same is of vital interest to all inhabitants of the District of North Kohala, Hawaii, and

Whereas, there is available a large tract of land mauka of Kohala, which is now unused and of no value for agricultural or pasturable purposes, aggregating approximately twenty thousand acre, and

Whereas, if reserved for forest same would be for all time a safeguard to the district against droughts, the agricultural and all other industries located in the North Kohala District would benefit;

Therefore, be it Resolved by the Planters and Residents of Kohala, that the Representatives and Senators of this District be requested to take such steps as may be necessary to enact such laws as will enable the government to acquire the lands extending from the timber line on mountains southeast of Kohala to such limits as are recommended by Forester Hosmer.

(Signed)	JOHN HIND,
"	ROBT. HALL,
"	H. H. RENTON,
"	J. ATKINS WIGHT,
"	H. R. BRYANT,
"	R. R. ELGIN,
"	GEO. C. WATT.

Mr. Campbell. I will call on Mr. Hosmer at this point, to describe the proposed forest reserve.

Mr. Hosmer. The proposed Kohala Mountain Forest is shown on the small blue print map that you hold in your hands. It is made from a tracing of a portion of this big government map of the whole island. It takes in the areas shown on this large map by the red lines. The red lines on the blue print take in the whole summit of the Kohala Mountain. In addition to this proposed reserve, a portion of the Kohala Mountain has already been set apart as a forest reserve—the Hamakua Pali Forest Reserve, set apart in 1904.

This new proposed reserve begins with the private forest reserve back of Kukuihaele, maintained for twenty years or more as a private reserve by the Pacific Sugar Mill and on which a good deal of planting has been done. Then it takes in the section back of and above the Waimea plains, a good deal of which is the government land of Puukapu, and all under lease to the Parker Ranch. Mr. Carter, representing the Parker Ranch, has caused fences to be constructed, shutting off this portion of the mountain all the way along from Waimea to the boundary of Waika. I believe that fence is now complete all the way. It consists of paddock fences and other connecting stretches of fence.

The forest reserve as I recommended it on October 14, 1908, did not include the land which we are today considering, because at that time it was not possible to get united action on it and because the Board of Agriculture and Forestry did not feel inclined to make a recommendation of reservation, unless there was prospect of getting something accomplished within a reasonably short time. For that reason the Committee on Forestry, thinking that something could be done and that the whole matter ought to be taken up at once, made the following report on December 3, 1908:

Honolulu, December 3, 1908.

Board of Agriculture and Forestry,
Honolulu, Oahu.

Sirs: Your Committee on Forestry have had under consideration the report of R. S. Hosmer, Superintendent of Forestry, under date of October 14, referring to the proposed Kohala Mountain Forest Reserve in the Eastern portion of North Kohala, and in West Hamakua, Island of Hawaii, and hereby recommend:

That, while approving of the recommendations of Mr. Hosmer, we do not feel that they go far enough in the protection of the watershed of the Kohala Mountains, and therefore further recommend that not only the area proposed by Mr. Hosmer, but the additional area suggested by him on page 8 of his said report, together with the small additional area as shown on the 1901 map of the island of Hawaii—marked in blue—(the said map accompanying the Governor's Report of 1906), be included in the said Forest Reserve.

And the Committee further recommends that the Superintendent of Forestry be instructed to at once proceed without further delay to locate said proposed additional area, as above recommended, and report back to the Board at the earliest date possible.

Yours truly,

H. M. VON HOLT,
Chairman;

W. M. GIFFARD,
C. S. HOLLOWAY.

I at once requested Mr. Wall to have the necessary lines run. This blue print map, sent out last spring, is the result. It shows the boundaries that I recommended be adopted. This recommendation is based on personal examination on the ground, the first soon after I came to the Territory in 1904, and I have been on the ground several times since. I decided that this little gulch, Hooleipalaoa, starting behind Puupili and coming down across Kahua 1 and 2 and Kehena 2, is the best boundary that can be adopted as the western limit of the Kohala Mountain Forest Reserve. It would, of course, be possible to carry the boundary further out on Kehena 2, but the cost of making that the forest line would be so much more expensive that I did not feel justified in recommending it. A good portion of the Hooleipalaoa Gulch is sufficiently deep and steep-sided to serve as a natural barrier, thus reducing the cost of fencing.

On this big blue print are shown the areas within the Hooleipalaoa gulch; also the areas of privately owned forest land between the makai boundary of Kehena 2 and the plantations.

This area includes the private forest reserves of the three plantations, which have been maintained by them for some years; by Niulii, Kohala and Halawa plantations. This lower line, which is the makai boundary line of the proposed reserve on the north, goes just above the head of the cane. This broken line shows what was in cane last year when Mr. Kanakanui was up there. This straight line is the proposed boundary of the proposed reserve. The area of each of the private lands and the name of the owner is given on this map: Pololu, belongs to the Government; then Waiapuka, 197 acres, Bishop Estate; Niulii, 560 acres and Makapala, 530, to Judge Hart; Aamakao, 710 acres, Kohala Sugar Company; Halawa, 493, Estate of Jas. Wight; then two or three small areas beyond; then the portion of Kehena 2, inside of Hooleipalaoa Gulch, Woods Estate, 2428 acres; Kahua liilii, or Kahua 1, 782 acres; Kahua nui, (Kahua 2) 482 acres; and Waika, 463 acres. Kahua 1 and Waika belong to Frank Woods in fee. Kahua 2 is Austin Estate, under lease to him. The government map shows Waika as coming up to a point. This is incorrect. This blue print shows the lines as they actually are.

Now the proposition, this afternoon, is to see if we can get to some definite understanding, in regard to a reservation of these areas.

Mr. Campbell. You have heard Mr. Hosmer in his description of the proposed area to be taken into the forest reserve. Now I would like to hear from any of the gentlemen present, as to whether there is any opposition to this area to be taken, or suggestions as to additional area, or suggestions as to the cane line.

I might in connection with that read this letter to Mr. Hosmer from Mr. Watt:

Kohala, March 5, 1909.

Ralph S. Hosmer,
Superintendent of Forestry,
Honolulu.

Dear Sir: Your letter of February 26 received and contents noted.

Messrs. Bond, Hind, Renton, Wight and myself met and discussed the matter yesterday. The opinion of these gentlemen seemed to be that the reserve should include all the lands inside of about two miles west of the Hooleipalaoa Gulch. As regards the three private forest reserves above the plantations I would say that I agree with your idea and have so expressed myself to the Halawa people here and also to their Trustee (Mr. R. W. Shingle) in Honolulu.

With regard to us here at Kohala, last year the directors decided to set apart nearly all of the Awini property as a government reserve which I consider would be quite an addition to any forest reserve that may be made in future.

Up to this time I have not consulted with Mr. Robert Hall of Niulii plantation and therefore am unable to say what his views on the subject might be.

If Niulii, Halawa and the Kohala Sugar Company were willing to turn over all these forest reserves to the Government, it seems to me that it would only be fair for the other three plantations; (Union Mill, Hawi and Puakea) to purchase Kahua and Kehena and turn it over as their contribution and more especially as these last named plantations will derive far more benefit from such a reserve than the others will.

Yours truly,

GEORGE C. WATT,
Manager, Kohala Sugar Co.

Mr. Hosmer. There is a string of hills out here to the west, beyond the Hooleipalaoa Gulch, which might be made the boundary (indicating on map a row of hills from Puuiki to Puu Oo, to Lahikiola, to Puu Liolio and Puu Manu), but that land has for so long a time been opened up and there is now no forest remaining on it, that it is a question of planting. The cost of fencing, too, would be much greater there. I believe that most of the protection that we need would be secured by having the boundary at Hooleipalaoa. Of course if it is simply a question of spending more money, I am not at all opposed to seeing the forest area extended. But it would very materially increase the cost, and it has seemed to me, up to the present, that we had better get Hooleipalaoa and the area inside done before we talk about getting further forest area, or planting further out towards Mahukona.

Mr. Campbell. The Board has within its power described the forest reserve as it should be, and I should be pleased to hear——

Mr. Hosmer. I should like to ask if the gentlemen are still of the same mind as they were when this (Mr. Watt's) letter was written?

Mr. Hind. That is, with the boundary as we have it there [on the map]?

Mr. Hosmer. As to bringing the boundary further out.

Mr. Hind. I think the boundary, as far as I am concerned, I think the boundary as laid out by you along the Hooleipalaoa Gulch is about all we can think of just now.

Mr. Watt. Well, after that map was finished and submitted to us, it was suggested by resident planters that there be more taken in. There was nothing definite said about it. That is why that letter was written.

Mr. Campbell. You think at all events that he has covered the ground fairly well, Mr. Watt?

Mr. Watt. Well, so far as I know. The other men know more about the country up there than I did, being practically a stranger.

Mr. Campbell. Mr. McCrosson, you are particularly familiar with that country.

Mr. Watt. I think Mr. Bluett knows that country well.

Mr. McCrosson. I think Mr. Bluett could state more intelligently about that now than I can or almost any of the Kohala people.

Mr. Bluett. I think that boundary is about the best that could be selected under all conditions, with the exception that the line could go to the west of Puu Pili, and take in the entire hill. There is a certain amount of forest on Puu Pili which is still good. Instead of running through the center of Puu Pili the line should circle the hill. I think that is the only change that I should suggest.

Mr. Hosmer. My recommendation in the report covers that, although the map does not show it.

Mr. Bluett. As regards those other hills, there are several, and a number of still other hills; those could sometime be fenced in and planted; that may have a very good effect without taking the strip in between.

Mr. Hosmer, reading from his report of October 14, 1908: "There should be also included in the reserve the south side of Puu Pili, to protect certain springs on the lower slope of that hill." Mr. Kanakanui has not worked up his field notes yet, although he is prepared to do so when this matter is settled. The line can go around the hill and take in that side.

Mr. Campbell. Mr. Holstein, can't you give us any expression of opinion on that subject?

Mr. Holstein. I think the Kohala planters have expressed themselves as favoring the Hooleipalaoa Gulch. I have been up there on several occasions and bear out Mr. Hosmer's statement, the gulch is a natural boundary with a few exceptions, here and there. I agree also with Mr. Bluett, on the proposition that the boundary on this Puu Pili should be on the west side instead of climbing up the middle and leaving half the hill for a cattle ranch and the other for forest protection.

The great difficulty in the discussion today will be as to what attitude the owners of these private lands will take in the matter. At the meetings we held in Kohala with the Kohala planters—I believe there were three meetings held—while we were unanimously in favor of forest protection in Kohala, the question is how much or what will these private owners of the land sell for? I believe when it comes down to the question of the Kohala planters buying a tract of land, they would be quite willing to do so, for their own protection as well as the protection of other people there. As we have the parties interested in these private lands here it strikes me that the best proposition now is to ask them whether they will sell. And if they are not willing to sell, the question is, will the Government proceed further in the matter?

I deprecate any proposition of condemnation of land for public purposes, the more so for private purposes, for the interest of the planters up there. I hope such an idea will not be carried out, because an agreement could be accomplished by the private meetings of the owners.

Mr. Campbell. Mr. Holstein, what is your feeling in regard to a possible exchange of land by the Government at Holia for forest reserve?

Mr. Holstein. Private exchange?

Mr. Campbell. Do you think the Government is justified in making an exchange with other lands for forest reserve?

A. It all depends on what land the Government is going to exchange.

Mr. Campbell. Well, possibly agricultural land for land of another kind?

Mr. Holstein. Then I am opposed to such a proposition.

Mr. Campbell. Lands of a similar character, you might be differently about?

Mr. Holstein. I would feel more favorable to such a proposition.

Mr. Campbell. The point I particularly want to arrive at is this——

Mr. Holstein. Pardon me, in that vicinity, we have a problem in the Kohala district, as well as in South Kohala, the reclamation of land, thousands of acres. I think the Government has in the neighborhood of 15,000 acres of pili lands, which in days to come will furnish homes for the people which you want to have in the Islands. The exchange of agricultural land, I am particularly opposed to in that neighborhood. And if we come to some proposition whereby these lands could be obtained by the Government, all the better.

Mr. Campbell. I think the situation with regard to any proposed changes in line by taking in Puu Pili and any smaller matter will be determined in the final adjustment. I wanted a general expression of opinion of the people of Kohala, whether we recommended reasonable boundaries and whether the people of Kohala were satisfied.

Mr. Campbell. Mr. Bryant, do you feel that we are on the right track?

Mr. Bryant. Yes.

Mr. Campbell. Practically every interest in Kohala is represented here today, and later on when we come to a conclusion we don't want to feel that we have made an error, or in our preliminary meetings determine on a thing which is not proper. If there are any objections to the line as established, I would be pleased to hear them.

Mr. Hosmer. If the line is not perfectly clear to everybody from these maps, there are here some of the detailed maps of the district, if anybody wants them.

Mr. Holstein. Silence gives consent.

Mr. Campbell. I so take it. Now we come right down, gentlemen, to the proposition, what can the Government do, and what can the interests in Kohala do? We are all here, and I think everybody is agreed on the importance of this thing, and the necessity of some action being taken to reforest Kohala. From the standpoint of the Government within the next two years and a half, if the land is acquired, the Government can expend a stated sum of money in reforesting those areas that may need reforesting, and in fencing. The Government is not in a position, gentlemen, to purchase the lands required in Kehena 2, and the other lands. If those lands are absolutely necessary to the forest reserve in Kohala, it is up to the interests in Kohala to aid the Government; but for the Government to go in and purchase those lands, it simply means another forest reserve on paper, because all the money that could possibly be devoted to that forest reserve would have to go then to the purchase of lands. But if the Kohala interests will aid the Government in securing these lands, why we can immediately start proceedings. I believe any money that the Government puts into this thing should be devoted exclusively to fencing and reforesting.

Mr. Swanzy. I would like to suggest, Mr. Chairman, that in order to classify things, we learn exactly how the lands in question are held. My understanding is that for these lands, 2428 acres being the larger land, Kehena, is owned by the Woods Estate.

Mr. Campbell. Yes.

Mr. Swanzy. That the next land to that, 463 acres, something like that, 463 acres it is on the map, is owned by Mr. Frank Woods; that the next piece to that, Kahua 2, is owned by the Austin Estate, and the mauka piece of all, Kahua liilii, is a piece of 782 acres owned by the Government. Now we have here today the representatives, if I understand it rightly, of the Woods Estate, of Mr. Frank Woods, of the Austin Estate, and it seems to me that it would be a good idea to learn from these gentlemen what their idea of the value of these properties is, what they would be disposed to sell them for. The Kohala people may have a little difficulty in arriving at conclusions regarding the way in which any purchases that may be made shall be divided, but before they can approach that matter at all, they must know how much it is that is to be divided, then there is to consider how much money is to be expended and then if they think that the reforesting of this land is not commensurate with the expense, why then we can drop the thing, but the first thing to find out, in my humble opinion, is what the owners of these lands ask for the land, and in the second place what the Government that owns 782 acres, if that is the area, would do with its land. In what way would the Government propose to participate in this reforestation? Supposing that it was undertaken, the Government has 782 acres. Would the Government give up that land for the purpose of the forest, would they participate in the cost of fencing? What in

other words would they do, that is what we ought to know, and then we ought to know from the representatives of these other interests here what their idea of their properties is. Then, as I understand it, Mr. Woods or Kahua Ranch have leases on the Government land and on the Austin Estate land and naturally they would have to be separate, so we would have to hear from them as to what they would need in consideration of giving up their leases or whether they would be willing to give up the leases without any consideration. If these points can be settled, then I think we can get along.

Mr. Campbell. Mr. Robertson, are you prepared at this time to state, as representative of the Woods interests, what sum of money you would be willing to take for the woods lands?

Mr. Robertson. I am not, Mr. Campbell. The Woods Estate as I understand it, would be willing to consider an offer that might be made by the parties in interest, who desire to acquire those lands, but I haven't any authority to submit any proposition on behalf of the Woods Estate at this time. We have to dissent from the language of that resolution read by you, passed at some meeting in Kohala, whereas this land of Kehena is dubbed as being of no value either for pasturable purposes or agricultural purposes. We claim that a large proportion of that area is good for either or both agricultural or grazing purposes. Secondly, any offer that might be made would not stand any chance of being accepted if it was made on the basis of that resolution. The parties at the lower elevations there that desire to see this forest reserve put through will have to bring themselves to a frame of mind where they must concede that these lands have some value, a material value, to the present owners. On that foundation the Woods Estate is willing to consider a proposition, providing one be made upon fair and reasonable terms. In other words, in order to help effectuate this forest reservation, the Woods Estate is willing to sell that area that has been designated by the red line here, a portion of Kehena 2, for such price as they deem fair and reasonable. In regard to Frank Woods, whom I also represent, I think Mr. Swanzy is mistaken as to Woods holding a Government lease. He owns two of those lands, Kahua 1 and Waika, in fee simple, and holds a lease from the Austin Estate of Kahua 2, with nearly twenty years unexpired.

Mr. Swanzy. Then there is no Government land there at all?

Mr. Robertson. Not that I know of. In regard to Mr. Frank Woods, Mr. Campbell, he does not desire to sell, but he is willing to entertain a proposition for exchange if practicable. In other words he wants to continue in the ranch business, and if those lands are given up for forest reserve purposes, he wants some other lands in lieu of them. Now then, if the Government, or any private parties in interest, are in a position to make any proposition for an exchange with Frank Woods, he would be glad to entertain it.

Mr. Campbell. That is Frank Woods' fee in Waika, 463 acres?

Mr. Swanzy. There are two pieces, 463 and 782.

Mr. Robertson. He has in round numbers 1200. Four hundred and eighty-two in this Austin Estate lease, in round numbers, 1700 acres.

Mr. Campbell. The exchange that he would want would be for 1200 acres of land?

Mr. Robertson. Presumably if an adjustment was made, it might also include the Austin Estate lease, I presume that would depend on what terms the Government or other parties were in a position to offer. I have nothing to offer. I don't know what there is available there in the way of an exchange with Frank Woods, but his position is against selling, and in favor of an exchange.

Mr. Campbell. The Government in 1905, had its sub-agent make an appraisement of the lands of the Woods Estate and the other lands that the Government requires.

Territory of Hawaii,

Department of Public Lands.

Hilo, Hawaii, August 14, 1905.

Jas. W. Pratt, Esq.,
Commissioner of Public Lands,
Honolulu.

Sir: In accordance with the instructions contained in your letter of the 1st inst., I met Mr. R. S. Hosmer, Superintendent of Forestry, in Kohala, for the purpose of looking over the lands of the Woods Estate wanted for forestry purposes, placing a value on the same, and also appraising the lower lands near the north point of this island, which lands it was thought at the time, the management of the Woods Estate wanted in exchange for Kehena 2, the land containing the forest.

On Saturday morning, August 5, we accordingly inspected the lands of Hualua, Kealahewa, Opihipau, Hukiaa and Kokoiki, situated near the North Point. Later on, on Tuesday, August 8, I again went over these lands with Mr. Tulloch, the local appraiser.

It was not until Tuesday morning, the 8th, that we learned from the management of the Woods Estate, just what lands were wanted, in return for the land to be given up, and we then found that the following was asked for in exchange:

1. Kawaihae uka, from about 2,100 feet elevation, to approximately 4,000 feet elevation. This would comprise an area of about 4,000 acres. This land is now under lease to the Parker Estate until 1913.

2. All the lands mentioned above, from Hualua to Kokoiki, situated near the North Point of Hawaii.

3. About 700 to 800 acres of the "Pili Lands," from Kaipuhaa to Paoo 6.

4. During the existence of the leases on the above named lands, the Woods Estate is to receive rent for Kehena 2, until the expiration of the respective leases; such rents to be paid by the plantations, who it is claimed, are most directly benefited by the conservation of the forest.

The land of Kehena 2, is said to contain 3,344 acres, or about one-third of the lands owned by the Woods Estate; of this area the Estate wants to turn over to the Government the part contained between a gulch named Hooleipalaoa, on the west, to the edge of Honokane on the east, and containing approximately 2,000 acres. From the Hooleipalaoa gulch to about where Niulii joins Kehena, there are large open stretches covered with Hilo grass, and swampy in places, thence to Honokane the forest becomes denser, until from a line from near Pololu to Honokane, it becomes impassable for horse back travel on account of the swampy nature of the ground. There are said to be some wild cattle near Honokane, which it would take some time to get out. The western portion has some tame cattle on it, as that part of the land is divided off into paddocks.

The elevation of the part of Kehena to be released, is from about 2600 feet to 3700 feet; there are no running streams on the land, but a number of the gullies contain standing water, the remains of rains, and which the cattle drink.

It is claimed by Mr. Woods, that Kehena is now the only fattening ground for their cattle, and for that reason the ranch would be of no value without said land. I have no reason to doubt that statement.

As land per se, at that elevation, Kehena would not be of any great value; not even as timber land, as it would be very expensive to get wood to market, on account of the swampy nature of the ground. In appraising the same, however, I have taken in consideration the relative value of land to the ranch.

I have endeavored to have Mr. Woods give me what valuation he places on the land, but up to the present have not received anything from him; it is claimed, however, that the income from the ranch as a property, is practically derived from that piece of fattening land.

For the purpose of arriving at a valuation, I have made inquiries at the Tax Office, and find that in 1903 the Puuhue Ranch lands were returned at \$26,678.00, and in 1905 in the neighborhood of \$28,500.00. Allowing Kehena to be worth two-thirds of the whole, would bring the value of the whole of Kehena to \$19,000.00; deducting therefrom the value of the one-third to be retained by the ranch, leaves a value for the forest part of \$12,667.00.

In placing a valuation of \$6.00 per acre on the land, nearly the same result is obtained. Say 2,000 acres \$6.00 per acre =

\$12,000.00, and which is the value I place on the part of Kehena mentioned as a forest reservation.

APPRAISEMENT OF THE LANDS FROM HUALUA TO KOKOIKI.

Of these lands, a small part may be classed as possible cane land, the middle portion being fair pasture, and the lower part dry pasture land. These lands, at the present time, are to a great extent overrun with a heavy growth of lantana, and for that reason I deemed it the most conservative plan, to appraise them at 8 times the rental, especially as the leases were made at a recent date, in 1902.

Hualua, rent \$1.35 per acre, value per			
acre \$10.80,	289	acres =	\$ 3,121.20
Opihipau, rent \$.70 per acre, value per			
acre \$5.60,	449	" =	2,514.40
Hukiaa, rent \$.70 per acre, value per acre			
\$5.60,	380	" =	2,128.00
Kokoiki (not leased), rent \$.70 per acre,			
value per acre \$5.60,	399	" =	2,234.40
Kealahewa (not leased, area unknown)			
rent \$.70 per acre, value per acre			
\$5.60, say	350	" =	1,960.00
Pili lands (not leased), value per acre			
\$1.00, say	750	" =	750.00
	<hr/>		<hr/>
	2617		\$12,708.00

Kawaihae uka: To obtain the middle part of Kawaihae uka, seems to be the main object of Mr. Woods. This is one of the best fattening grounds, and acre for acre is worth fully as much, if not more, than Kehena. I must state, however, that by taking out the middle part of Kawaihae, should such a thing be feasible, on account of the lease now on the land, and for other reasons, in my opinion the lower part of Kawaihae, being the dry part, would become practically of no value to the Government.

As to the Pili lands, Mr. Woods does not care much whether he gets them or not, providing he gets the other lands desired.

Regarding the advisability to preserve the forest in that neighborhood, I have only to say, that where 25 years ago I have seen heavy forest, there is now absolutely none. On Kehena, where the cattle have killed the forest, the swampy features also disappear rapidly; the question apparently being how much the people should pay for the conservation of forests on private property.

Respectfully submitted,

(Signed) GEORGE H. WILLIAMS,
Sub Agent 1st and 2nd Land Districts.

Mr. Bluett. Whose report is that?

Mr. Campbell. George H. Williams to Land Commissioner Pratt.

Mr. Robertson. And the date?

Mr. Campbell. August 14, 1905. The Board of Agriculture and Forestry have discussed the proposition, Mr. Swanzy, as to the amount of money which could be devoted for the next two years to reforestation and fencing in the Kohala Forest Reserve, and have concluded that \$25,000.00 can be devoted to that purpose. Not for the purpose of purchasing the land, but directly to reforestation, fencing and the necessary expenses. It is a liberal proposition, and I believe the Government's function is in the actual work of reforestation those areas that need reforestation—there are certain areas in this forest reserve, I understand from Mr. Hosmer, that when protected against cattle, and fenced, will reforest themselves very rapidly. The Board's position, I think, is quite clear, gentlemen, but if this thing is to go through on the lines suggested, we must have the assistance of the interests in Kohala. I want to say very frankly that I, as Land Commissioner, do not favor the exchange with the Woods Estate of these remnants along the north point, as I believe eventually they will be of material advantage. They are small remnants. Portions of them are good lands, and with the extension of the Kohala Ditch and improvements contemplated, I think may all come under that ditch. They are too valuable for the Government to give away in this exchange.

Mr. Dowsett. Mr. Chairman, we have heard from Mr. Robertson, representing the Woods Estate, and Mr. Frank Woods. Is there anybody here to speak for the Austin Estate in regard to the land that Mr. Woods has under lease?

Mr. Bottomley. I represent the Austin Estate land. The land is under lease and you will have to take it up with Mr. Woods before saying anything, and also take it up with the Austin Estate. We will do that.

Mr. Petrie. Mr. Chairman, on the basis of your last statement, do I understand that all that will now be required to consummate the scheme outlined will be for the parties in interest to acquire those lands and the balance will be taken care of by the Government, on whatever basis that it can be done? That is the point now in controversy.

Mr. Campbell. That is the point in controversy.

Mr. Swanzy. Then Mr. Campbell, there does not seem to be anything else to do but to ask the Government to negotiate with Mr. Frank Woods and the Woods Estate for these lands that it is so important to acquire before this can be consummated?

Mr. Campbell. Mr. Swanzy, the Government feels that it has gone to the limit of its resources when it is willing to throw into this particular forest reserve \$25,000.00. If we should take the \$25,000.00 and buy these lands, if they are willing to sell them for \$25,000.00, it would leave us as I said before, with a

paper forest reserve. The Government must have a fund to devote absolutely to forestry and I think the people of Kohala should get together and see if they cannot secure these particular lands, as they are the people directly benefited. Then the Government will expend \$25,000.00; to be devoted to forestry and fencing. The maintenance would necessarily come on the Government, in the upkeep of fencing and policing, so that what the Government puts in now, that is, in the next two years and a half, is not all—there is a continuous yearly expense on the Government.

Mr. Swanzy. I think the offer of the Government is exceedingly liberal and it relieves the parties in interest as to any consideration as to care of the reservation to be created, when the fencing is done. But wouldn't the Government undertake to negotiate with the parties in interest to see if they cannot be gotten to name a reasonable price? If they will sell at a reasonable price I take it for granted that the plantations of Kohala will be able to raise the money to buy the land.

Mr. Campbell. If the Government had any assurance whatsoever, that the interests at Kohala would do that, we would immediately start negotiations in an endeavor to come to a conclusion as regards price.

We believe, however, that if the interests of Kohala would simply come together and arrive at a determination how far each one is willing to go in this matter, then the entire negotiations might be completed with the Government for these lands, and then we could say yes or no. We have been trying since 1904. The Board wants to pass the responsibility of aid in this matter directly up to Kohala and its interests. It is an important thing, it is a thing that I may go on and talk about for an hour, the benefits of forestry, and we would not be any nearer to a conclusion. We all know the benefits, but the Government is unable, even with the liberality of the Legislature in its act, to give all to Kohala. We have other interests to consider and if \$25,000.00 is devoted to this forest reserve it seems to me that the Government has done all that is necessary. Now if Kohala will say that we have only one thing to do, and will go and get the Woods interests and Austin interests to say yes, then the forest reserve is not on paper, but is an actual fact.

Mr. Swanzy. The Woods Estate owns 2400 and odd acres, which, as I understand it, they are willing to dispose of, if they can get a price which pleases them. Mr. Frank Woods is not disposed to sell and we don't know what the Austin Estate will do. It may be difficult to get lands suitable for Mr. Frank Woods to exchange for this. Under these circumstances, if the Frank Woods and Austin Estate lands cannot be acquired, and if the Woods Estate land of about 2400 acres can be acquired, would the Government be willing to fence that in and reforest it? Would they be willing to do a part of the work if it was not pos-

able for them to be offered the whole of the land for reforestation?

Mr. Campbell. I may ask Mr. Hosmer, as expert on that matter, what benefit a portion would be without the whole?

Mr. Hosmer. In reply to that question, I would say that I should much prefer to see the thing go through as a whole, because I believe the value of reserving this whole lot of forest would be much greater than reserving a portion of it. But I do think the Kehena 2nd portion is probably the more important portion of this block, for the reason that several of the small streams that come down into the plantations, some of which go into the ditch, and some others which ought to go into the ditch—surplus water at any rate—rise on this land, or are very largely influenced by Kehena 2nd. And some of those streams don't go up as far as the Kahua lands. For that reason I think the Kehena 2nd portion is somewhat more important than the Kahua lands. Every effort ought, however, to be made to get the whole block.

Mr. Campbell. In this matter the Government has the right of eminent domain; it could condemn those lands. Of course that proceeding does not want to be invoked except as a very last resort. But, however, if we went into condemnation proceedings for this forest reserve, we would have to be backed up by somebody to guarantee the costs and payment of the judgment rendered by the court, and we could not go into condemnation proceedings until we had such a guarantee. I believe there are other ways to settle without going to that extreme. Of course, in condemnation proceedings there are many nice features that come in. It is a long, slow process, and it might take years to perfect, or get a ruling from the court, or a decision in the matter. In the meantime we are still at a standstill.

Mr. Holstein. Wouldn't it be a good thing for the Kohala planters, who are present here today, as well as those who act as attorneys and agents, to come together this afternoon and see what they will offer for these lands? I believe this is the sticking point between the ranches and the planters.

Mr. Watt. I think that the sticking point has always been that the Woods Estate has always refused to state what they would ask for those lands. They would make no statement. Our last meeting, I understood Mr. Holstein was going to write to ask them to state a price. Whether he has done it or not, I don't know.

Mr. Holstein. They were to hold a meeting. The idea was that the Woods Estate was to come together sometime in September and state to us how much they wanted for these lands. If they are going to ask too large a price for it I don't think that the Kohala planters will deem it advisable to have anything to do with it, but anything within the limit, I think the Kohala planters are willing to consider. I would like to hear from Mr. John Hind on that subject.

Mr. Hind. Well, that is just about as far as the thing has gone. Mr. Holstein put that idea up to the Woods Estate. I understood they had a meeting the other day, but I could not learn what decision they had come to.

Mr. Holstein. Neither have I learned.

Mr. Campbell. In searching through the entire records of the Kohala forest we can find nothing in the form of a proposition from the Woods Estate. They may have sent one in and it may be lost. There is a very easy solution, gentlemen, here are the three parties in interest, the Woods Estate, the planters and the Government, and I think a Board of Appraisers, one from each, would settle that very quickly.

Mr. Swanzy. You can settle nothing until you have something to settle. One man wants to sell, but he will not say how much he wants.

Mr. Campbell. That is exactly the condition of the matter now. I understand from Mr. Robertson that he is willing to sell Kehena, but Woods wants an equivalent in exchange for the other land.

Mr. Swanzy. He is willing to sell Kehena for cash, but Mr. Frank Woods, with the Kahua lands, wants to exchange.

Mr. Robertson. Mr. Chairman, it does not seem to me that the matter is up to the Woods Estate at all. The Woods Estate are not putting their land on the market, they are not looking for any buyers for the Woods Estate. If the Woods Estate has anything that someone else wishes to buy, it is for that other party to come along and make an offer for it, and that is certainly true of the Superintendent of Public Works defending the work of the Government in the matter. It puts the whole thing up to the Kohala plantations and if they want the lands it is up to them to make an offer. So far as I know the Woods Estate are willing to consider an offer, but they are not putting the lands on the market. If somebody wants to buy them it is up to them to say what they are willing to pay. One thing is very sure, that there won't be any business done on Mr. Williams' figures. Mr. Williams' report shows on its face that he has underestimated the proposition. The fee simple of a piece of agricultural or grazing land is certainly worth more than eight years' rent, anybody ought to know that, and it is safe to say that no business can be done on that line. The people of Kohala know, it seems to me, better than that, and now, wanting those lands, it is clearly up to them to make their offer. In regard to Frank Woods it is apparently a little more difficult. I don't know whether the Government has anything in that vicinity that they might be willing to exchange with him. The Chairman states that they would not be willing to exchange lands up toward the north point. There might be something else. May be these private parties in interest might be able to acquire something that they might then exchange with Frank Woods. It is apparently a more complicated proposition than dealing with the Woods Estate. I cannot agree with the last

gentleman who spoke that it is up to the Woods Estate to make an offer.

Mr. Campbell. With regard to Mr. Williams' appraisalment, it simply is a part of the problem under discussion that has been going on in this matter, and it would probably have very little relation to either an exchange or purchase. Would the Woods Estate consider a reasonable proposition?

Mr. Robertson. They will.

Mr. Hind. The planters have had no assurances of that fact.

Mr. Campbell. Can you give the Government an assurance of the fact that they will consider a price, Mr. Robertson?

Mr. Robertson. Why certainly, I thought I had already stated that. They are willing to sell if a fair price is paid them. That is about all there is to it. But I am not authorized this afternoon to make any offer, and I say, the position of the Woods Estate is that they are in a receptive mood and waiting to hear an offer when it is made.

Mr. Swanzy. Would they be willing, Mr. Robertson, to have an appraisalment, and abide by the result of that, an arbitration as to the value? They could appoint one, the planters' interests could appoint another one. Would that be acceptable to them in order that we might arrive at some solution of this matter?

Mr. Robertson. I hardly think so, there are too many chances in arbitration.

Mr. Campbell. In the matter of the appraisalment, the Government is a party at interest, the Woods Estate is a party at interest and plantation interests parties.

Mr. Robertson. I don't think that is any objection to an appraisalment being made as a basis for negotiations, but as to being bound by the appraisalment of anybody, we don't propose to make that agreement.

Mr. Campbell. Even for the purpose of arriving at a figure, I think we are getting somewhere near the mark.

Mr. Robertson. To serve as a basis for negotiations?

Mr. Campbell. Yes.

Mr. Robertson. I cannot see any possible objection to that.

Mr. Campbell. Then it is, gentlemen, up to you of Kohala to appoint one appraiser and the Woods Estate another and the Government a third, or let the two of you select a third and the Government will leave it with the parties in interest and keep out of it.

Mr. Swanzy. It would be satisfactory to you, Mr. Chairman, I presume, that the appraisers for the purpose of arriving at some basis for settlement should be appointed by the parties in interest, the third if they are unable to agree, to be appointed by the Government.

Mr. Campbell. That was my first suggestion, but I thought it would be better, if the third was selected by them.

Mr. Swanzy. Why not by the Government?

Mr. Campbell. And they select a third, the usual form.

Mr. Robertson. I don't know that there is anything to be gained by that, for the appraiser appointed by the plantation would take the plantation's view of it, and the appraiser appointed by the Woods Estate would take the Woods Estate view of it. Is it not better for the planters to consider the matter themselves? I am inclined to think that possibly that can be done. Let the planters sit down and give careful consideration to the value of that land from the ranch standpoint, if they can put themselves in that position, and having come to the conclusion as to how much they are willing to pay, let them authorize somebody to make an offer. It may be that their offer will be accepted. I don't know. It seems to me that the thing will come to a focus quicker that way than agreeing on the machinery for agreeing on appraisers.

Mr. Campbell. The Government's position is to get the thing settled as quickly as possible, because by the first of November we ought to have money.

Mr. Swanzy. I understand the Government is willing to use such portions of the \$25,000.00 for the fencing of Kohala as is necessary for the work.

Mr. Campbell. Yes.

Mr. Hosmer. I have not been on the land for some months, but my impression is that most of the places that would have to be replanted would be on Kehena 2. Kahua, except right back of Puupili, has not been opened up so much but that if a fence is put there, the forest will come back naturally, but on the land where cattle grazing is going on, and where it has been going on for some time, artificial reforestation would be necessary to help out natural reproduction.

Mr. Campbell. The \$25,000.00 would be in this district. There may be some necessary fencing here and there, but the major portion, twenty-three or twenty-four thousand dollars, will be devoted to this area acquired by the plantation interests. That is a definite statement of fact based upon a resolution of the Board on that point. Mr. Robertson, as attorney for the Frank Woods Estate, are you still holding to the proposition that he wants an exchange?

Mr. Robertson. Yes.

Mr. Campbell. To be a little clearer, Mr. Swanzy, if we only secured a portion of these lands, we could only afford to spend a portion. Our offer was to expend \$25,000.00, is to take the whole thing, and a proportionate part should be expended if only a portion of these lands should be acquired.

Mr. Petrie. Mr. Chairman, leaving aside the discussion of Kehena No. 2, I want to ask if the Government has any solution in view of the situation with Mr. Frank Woods, on the basis of an exchange. It seems to me he is not disposed to sell unless he acquires other pasturable lands to continue his ranch business. Has the Government anything in view whereby that part might be solved?

Mr. Campbell. I cannot give you an answer to that this minute, because I have not in view any lands that might be exchanged. If we have not, we have the other alternative, we can condemn. However, that is a matter that I would be very glad to look into, but I cannot recall now any land that we have.

Mr. Petrie. So far as Kehena No. 2 is concerned, it does not seem to be of much use to continue this discussion, in view of the attitude that they have taken, and it now remains for the other interests to get together and see if they can make an offer to the Woods Estate to purchase.

Mr. Campbell. If the interests in Kohala would get busy on that end of it and assure the Government that they would pay the judgment on condemnation proceedings against the Woods Estate, why, we will arrive. That is the only point. I am going to work and try to get a definite answer from Frank Woods, and also an application as to what land he might want. He might want lands that it is impossible for us to give, then we would be up in the air. If we cannot come to a reasonable exchange, then it comes to the question of condemnation, and if it comes to that question, then the interests of Kohala must stand by the Government.

Mr. Petrie. That might be their conclusion as to how far they are willing to go in the event of the condemnation proceedings.

Mr. Campbell. Can the Kohala interests get together before the steamer leaves tomorrow and give the Government some idea of what they think they are willing to do? Before the next Legislature meets we want the Forest Reserve fenced and trees planted on it.

Governor Frear, we would like to hear from you on the Kohala Forest Reserve matter.

Governor Frear. I did not intend to say anything today as I do not feel that I am very familiar with the details of the proposition. It is a proposition, however, in which I have been very much interested for a long while. It seems to me that if there is any place in the Territory where there is need of the application of a correct forestry policy it is right there in Kohala, and something ought to be done and done soon. Mr. Campbell is quite right in stating that the Government is not in a position financially to purchase these different tracts, although it is in a position financially to do much in the way of fencing and in reforesting and in maintaining the forests in the future. I am going a little further, and say that I do not think it is correct in principle that the Government should purchase these tracts even if it had the money, where the principal beneficiaries would be the private owners there. Just suppose for illustration, that all of this part of Hawaii belonged to one private individual, he would not expect the Government to buy this portion here and put it into the forest for the benefit of the rest of that man's land. On the other hand, supposing the Government owned the whole of that tract, you expect the Government to lay out all of that and keep it as forest, and then sell

just the other portions of it if it sold them at all. Now, in general, on these islands, there are government and private tracts sandwiched in. The typical case is the island of Kauai, which is a round island made up of one big mountain, cut up into lands in apple pie fashion, Government, private, Government, private, right around the island. Now everybody that owns one of those tracts of land extending from the seashore up to the top of the mountain is interested in having the upper portion kept as forest reservation for the benefit of the lower portion, and so placing the Government and private owners all on the same basis, each one having upper land and lower land all around the mountain, you would expect all of them to combine and set aside his upper lands for the benefit of the lower lands. That is what they are doing. That is what we are doing here, although this is not quite as typical a case. The principal lands to be benefited are these private lands around here. The Government has some land here, but the principal tracts here are going to be benefited but very little to speak of by setting aside this forest reserve. Now suppose this forest reserve is set aside as outlined here by the blue line (indicating area on the map showing government ownership), you will note that the Government is giving anyhow a majority of it, all this in green here and this in green here, it is all set aside, this green, which is directly for the benefit of the lands over here as well as the land over here, so that there is really only this little land over here [Kehena and Kahua] which is to be contributed by private individuals or corporations. I don't know what the best thing to do is to get at this thing to settle it. I should think that the Woods Estate is on a little different basis from a sugar corporation. Perhaps the best way would be to get together and appoint a number of appraisers, three or five, according as it may seem best, and let them appraise the different tracts that are needed for the forest reserve, and then make another appraisement as to the payment for those tracts, that is, how much is this plantation and this plantation and this one to be benefited by this, that is relatively, and then divide up the cost of all of these factors of forest reserve among these different people in proportion to their benefits, and pay these different owners the amount. It may be that that is not practicable. Perhaps the best way would be simply for the Kohala people, those most interested in the matter, to get together and see what they can do towards purchasing the different interests and then dividing the cost up amongst them.

Mr. Hind. One of the most difficult questions to settle, I believe, is how the proportion will be borne by the different plantations.

Governor Frear. Yes.

Mr. Hind. Now take the matter of our plantation, there is a very large area there of government land. Now we will be called upon to pay our pro rata, but the pro rata of what, land that we may lease? There are a number of leases already expired, and I have not been able to renew them so far. The question is, must

I include those lands or not as a part of our plantation? As the thing stands now, they cannot be.

Mr. Hosmer. I may say in continuation of the point that Governor Frear made, that the area included in the Kohala Forest Reserve as originally recommended was 53 per cent. Government land. Of the remaining 47 per cent. in private ownership, 33 per cent. is Bishop Estate. Since this red line was drawn across Kehena and Kahua, the proportions are somewhat changed.

Governor Frear. Does that take that (indicating Hamakua Pali Forest Reserve) in, too?

Mr. Hosmer. No, that is already set aside as another reserve. That is all Government land except this little white strip here.

Governor Frear. Yes, but these lands get all the benefit of the trade winds and get the precipitation.

Mr. Hosmer. Certainly. That would make the Kohala mountains as a whole 75 per cent. Government ownership.

Mr. Campbell. I desire to thank you gentlemen. We have come nearer to an understanding than we ever have before.

The meeting then adjourned.

A NEW HAWAIIAN SHRUB.

Under the title "A New Hawaiian *Scaevola*," Mr. Joseph F. Rock, the Botanical Assistant in the Division of Forestry, has recently described a new species in the Bulletin of the Torrey Botanical Club, New York. The description is as follows:

SCAEVOLA SWEZEYANA, Rock.

A shrub 9—12 dm. high, with stiff, glabrous, rambling branches. Leaves glabrous, oblanceolate, 38—76 mm. + 12—18 mm., on petioles 6—13 mm. long, mucronate, entire, somewhat fleshy; peduncle single-flowered, 4—6 mm. long, entire, slightly pubescent, with two oblanceolate, foliaceous bracts below the calyx 6—18 mm. long by 2 mm. broad; calyx 4 mm., glabrous, with short, bluntish teeth of unequal size; corolla pubescent, 5-lobed, yellowish green with reddish brown streaks; tube 18 mm. long, erect, corolla-lobes linear-lanceolate, sharp-pointed, scarcely margined, 16 mm. + 3 mm.; stamens somewhat longer than the tube; style incurved, pubescent throughout, little shorter than the corolla, indusium glabrous, ciliate; drupe glabrous, crowned by the calyx-teeth, 5—6 mm., two-celled, putamen black, crustaceous.

The type is No. 4804 (in the herbarium of the Board of Agriculture and Forestry), collected in the woods on the middle ridge of Niu Valley, Oahu, at an elevation of 1200 feet (August 22, 1909). The species is named in honor of Mr. O. H. Swezey of the Hawaiian Sugar Planters' Experiment Station, who discovered the plant and called my attention to it.

Hawaiian Board of Agriculture, Honolulu, Hawaii.

THE NEW RUBBERS.

The three species of Manicobar which have been botanically described—*Manihot dichotoma*, *M. piauihyensis*, and a third *M. heptaphylla*, seed of which we have not yet succeeded in obtaining in Ceylon—occur wild in the Provinces of Bahia and Piauihy in Brazil in latitudes ranging from 8 to 15 degrees south. So far much the fullest account of these plants in their native country is that given by Dr. Ule in the "Tropenpflanzer" for December, 1907, a translation of which appeared in the "Tropical Agriculturist" for March, 1908. From this account it appears that these species grow naturally in a much drier and more mountainous country than the Para rubber (*Hevea brasiliensis*).

"Here *Manihot dichotoma* grows in the true Catinga forest, and is especially abundant on the mountain spurs. The more park-like regions where individual trees stand scattered is avoided by *M. dichotoma*, which prefers a rather more thickly wooded country. It develops best on a red loamy soil, and is less frequently to be found on a sandy substratum. Within a few miles of Porto Alegre on the Rio das Contas, a central station for the production of rubber from this species of *Manihot*, I have seen the mountain spurs so thickly covered with this tree that it made up almost half the total forest." (Ule.)

From an account of the methods employed in tapping these trees in a wild state, and of the yield so obtainable, reference may be made to the above-mentioned translation of Dr. Ule's paper. We are now more directly concerned with the value of Manicobar rubber as a cultivated product when planted on estates. Dr. Ule gives it as his opinion that the wild thickets of *Manihot dichotoma* will very soon cease to have any value as a source of rubber. The export of rubber from the State of Bahia is said to have increased more than ten-fold between the years 1900 and 1906, that is to say, from 100 tons to over 1,100 tons, but very little of this was from plantations. Recently, however, large areas in this district appear to have been planted up with these Manicobars, and from the accounts given by Ule and others the success of these undertakings seems to be assured.

The following advantages are claimed by Messrs. Vilmorin for the new rubbers as compared with ordinary Ceara:

The latex is not so thick; it coagulates less rapidly, and is therefore easier to deal with; it yields a rubber of much higher quality.

Secondly, it contains a much larger proportion of pure dry rubber.

Lastly, the yield is greater. Whereas the raw rubbers of Ceara and Piauihy give only 60 to 67 per cent. of pure caoutchouc, the proportion obtained from *Manihot dichotoma* varies from 70 to 92 per cent. These figures do not, of course, refer to plantation rubbers.—Tropical Agriculturist, Colombo.

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